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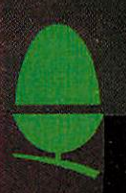
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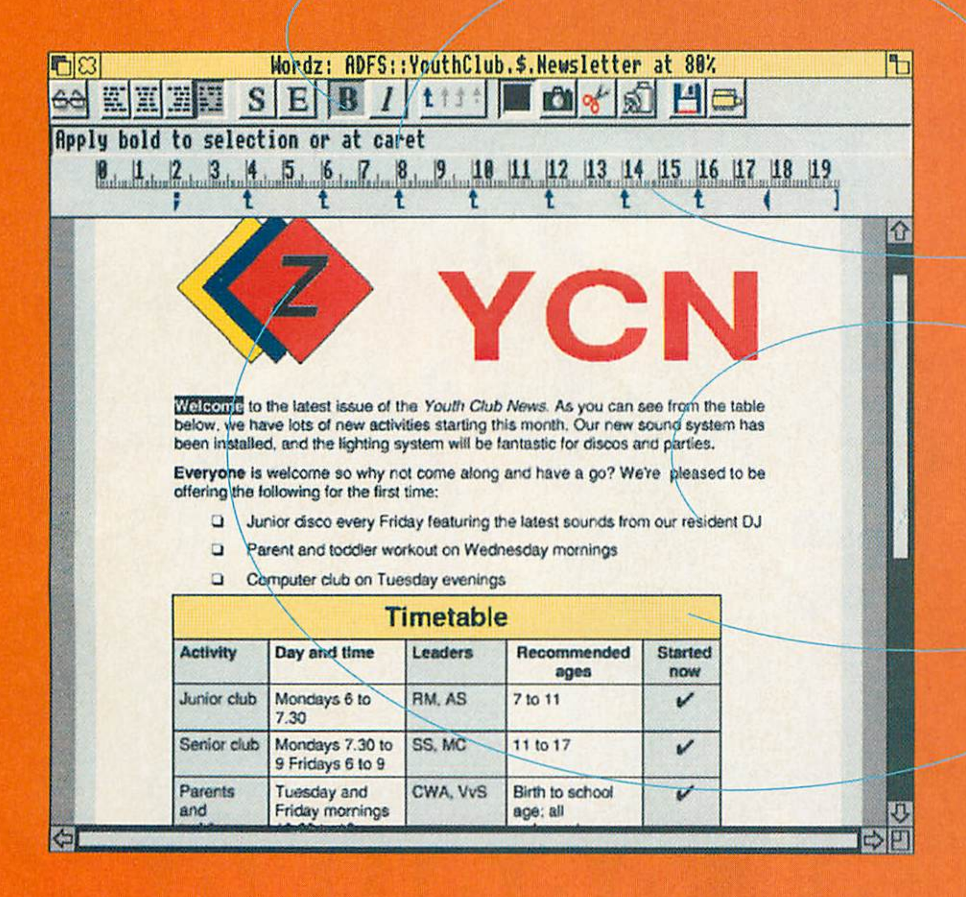
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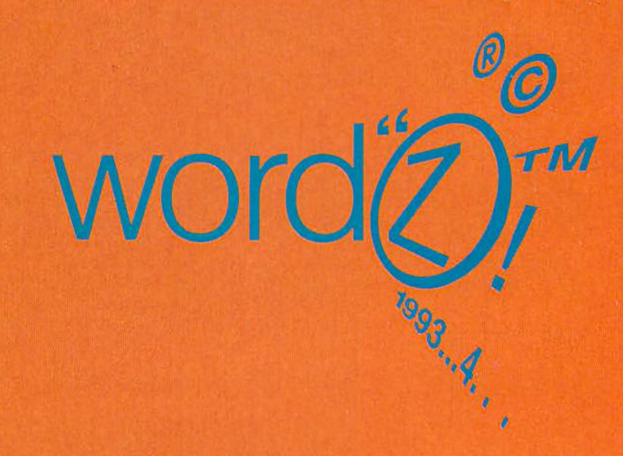


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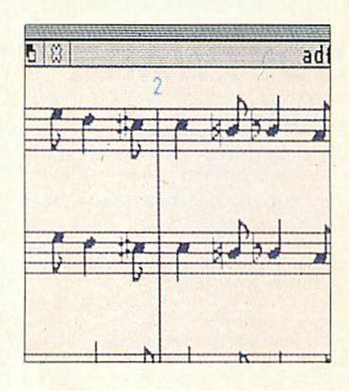
Published by Redwood Publishing, a BBC Enterprises Company, 101 Bayham Street, London NW1 0AG. Tel: 071-331 8000. Fax: 071-331 8001. Redwood Reader Services Executive: 071-331 8022. Bureau setting and ad typesetting by Bold Gray Design, 52 Rosebery Avenue, London, EC1R 4RP. Colour by Trumps Studio, Ware, Herts. Printed by Cradley Print Ltd, West Midlands. Distributed by BBC Frontline, Park House, 117 Park Road, Peterborough. UK Basic Annual Subscription Rate: £22.95

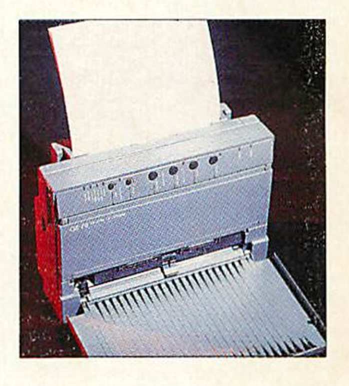
ABC
Member of the Audit Bureau of Circulation

Redwood Publishing is a registered data user. ISSN 0263 7456.

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All the editorial pages in BBC Acorn User are produced using Acorn computers, Computer Concepts' *Impression 2*, LaserDirect printers and Taxan monitors











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IMPORTANT NOTICE If you have version 2.5x of our IDEFS, please telephone 0274 580519 for some important news. To see which version you have, type Help IDEFS at the command line. If it starts with 2.5, call us now.



ACORN GOES FOR VIDEO GOLD

THE FIRST interactive computer game incorporating full motion video (FMV) clips stored on floppy disc was recently exhibited by Acorn at the Gamesmaster Live show in Birmingham. The FMV system used is Acorn Replay, which has real-time video decompression running in software. Replay will run on practically any Risc-based Acorn with 2Mb of Ram.

The game is an updated version of *Quest for Gold* and the Replay clips include athletes Linford Christie, Colin Jackson and Fatima Whitbread 'interacting' with players.

Acorn's consumer sales and marketing manager, Richard Percy, thinks Replay clips could well form the basis for a new generation of games: 'Replay will add a sense of realism to games, undreamed of by today's programmers, which will even surpass the capability of the dramatic, but expensive, Laserdisc-based arcade games.'

That's very optimistic talk; Replay display quality is not comparable with videodisc. But it is certainly relevant that you don't need an expensive CD-Rom or Laserdisc player to view Replay FMV clips.



Seriously Bad: Acorn's custom exhibition trailer

Percy continued: 'This system has enormous potential. Games running only from floppy discs will be dramatically improved, while the capability of games running from hard discs will take on a totally new dimension.'

● Underlining Acorn's most determined effort to date to break into the home and leisure computer scene, the company displayed a substantial presence at the Gamesmaster Live show.

The centre-piece of Acorn's exhibit was Seriously Bad; a custom exhibition trailer surrounded by a large games arcade featuring the latest Acorn computers. Another attraction of the show was the now-familiar *Quest for Gold* Challenge.

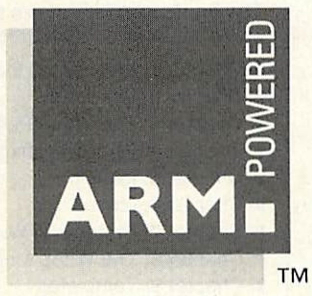
Acorn's consumer marketing manager, Simon Lovesey, said: 'We believe that our presence at this show will improve the credibility of our computers among the game-playing fraternity and open their eyes to the other features that should be available to home computer users.'

ARM STRIKES BACK

IN A response to Intel's successful slogan 'Intel Inside'; Arm Ltd has come up with a similar campaign. Arm Ltd's logo (right) is to be attached to any products using Arm chips.

● At Arm Ltd's Comdex bash we reported on last month, representatives from Arm chip makers GEC Plessey Semiconductors (GPS) and VLSI Technology were discussing faster Arm600-series chips; 0.8 micron 30MHz Arm610s will be available soon.

Acorn has yet to announce any products based on Arm600 chips, but two key letters of the alphabet seem to be stirring up the grapevine; 'NT'; Microsoft's up and coming 32-bit platform-independent version of Windows.



A few more Arm applications have recently come to light. Philips is using Arm technology in a new range of video telephones. VISI Technology says it will apply Arm chips in the field of fuzzy logic control solutions. Meanwhile an unnamed company has integrated an Arm6 macrocell into a custom chip to be used in a satellite TV downlink unit.

A LA MODE

STATE Machine's G8 graphics cards now have a bundle of new screen modes, plus a fix for a compatibility problem with certain microprocessor controlled Eizo monitors.

The new screen modes include custom modes for Eizo 9060 and Acorn AKF18 monitor users which reduce or eliminate the need for knob-twiddling to reposition the display when changing screen modes. There are also additional screen modes with very high logical resolutions; for example 1152x848 (up to 256 colours), 1600x1200 or 1280x1024 (up to 16 colours), yet these remain compatible with standard multi-scanning monitors like the Acorn AKF18.

NEWS IN BRIEF

● Cleveland-based Lynsoft has produced a low-cost playable demo version of its new text adventure *The Survivor*. The program normally costs £9.99 but the demo version is available for £1.95 including postage. For more details, contact Lynsoft at 23 Coral Street, Saltburn, Cleveland TS12 1DB.

● The Health & Safety Commission has published new regulations concerning the use of computers in places of work. From 1 January, employers will be obliged to assess the workstations provided for employees and ensure that equipment meets newly published guidelines.

Workstation users will also have rights to regular breaks or changes of activity away from their computer workstations as well as be able to request free eyesight checks. For full details of the new H&SC regulations see *Display Screen Equipment Work: Guidance on Regulations* (ISBN 0-11-886331-2), available from HMSO or booksellers priced £5.

● Ace Computing has announced Risc OS 3.1 printer drivers for the new Hewlett-Packard DeskJet 550C colour ink-jet printer, which was one of the recent *BAU* Show hits. Ace's new PROdriver 550C takes full advantage of the new printer's added blank ink cartridge for superior black print.

Colour prints only require a single pass, though there is an option to mix black with colour print in two passes. The new driver is £47+VAT and P&P. For further details contact Ace Computing at (0223) 462212.

● The Electronic Font Foundry (EFF) is now charging 30 percent less for its Risc OS 2 fonts. According to EFF, the price reduction was introduced because all of its 500+ fonts are now available in the new Risc OS 3.1 auto-kerning format jointly developed by the EFF and Acorn. However those looking to cut costs can still use Risc OS 2 fonts with Risc OS 3.1 and manually kern characters when necessary. Risc OS 2 fonts start at £1.40 each in packs with Risc OS 3.1 versions starting at £2.20. EFF: Tel: (0344) 28698.

The New Generation!

RISC user



RISC User, the highly popular magazine for Archimedes users, is bigger and better. The new RISC User is now B5 size which offers a sophisticated design, bigger colour illustrations and bigger pages with more information. Altogether better value and no increase in price.

RISC User is still a convenient size to assemble into an easy-to-use reference library, containing all the information you need as an Archimedes user. Every issue of RISC User offers a wealth of articles and programs with professionally written reviews, lively news, help and advice for beginners and experienced users, and items of home entertainment. Altogether RISC User has established a reputation for accurate, objective and informed articles of real practical use to all users of Acorn's range of RISC computers.

RISC User Disc The RISC User magazine disc is widely acclaimed as the best magazine disc available for Acorn computers. Each disc is packed with original software of the highest quality, fully tested and supported by our own staff plus all the programs from the magazine.

Discounts RISC Developments is also well known for its range of professional software and hardware. As a RISC User subscriber you will receive at least 15% off any RISC Developments' software and 5% off RISC Developments' hardware, and this list of products is constantly growing.

A year's subscription to RISC User is £19.90 for the first year and only £18.40 for a renewal. (Overseas: £29 Europe, £38 Americas and Africa, £41 Elsewhere).

THE BEST PROGRAM AND TEXT EDITOR FOR THE ARC HAS JUST GOT A LOT BETTER

NEW

DeskEdit2

A major new release of the popular and powerful editor DeskEdit brings a whole toolkit of features that will assist all programmers, whether novice or experienced, and whether using Basic or C - and all within Acorn's powerful multi-tasking RISC OS Desktop. There is a lot for text users too.



New features include:

- **Basic program Renumber** - including partial renumber and marked sections.
- **Basic Program Indenter** - indents Basic programs after IF THEN, REPEAT, FOR etc.
- **Basic Abbreviations** - all Basic V's several hundred abbreviations are implemented).
- **Programmer's Calculator** - a powerful calculator especially designed for handling bits and bytes.
- **Multi-purpose Browsers** - an easy to use browser window containing a list of finds. Clicking on any one of these will take you to the corresponding place in your file.
- **Throwback** is fully implemented so DeskEdit can respond to messages from C compilers etc.
- **!FIND** - DeskEdit comes with a powerful stand-alone Acorn application called *Find*, which can find text strings in a whole group of files, just given a wildcarded filename.
- **Extended Saves** - DeskEdit 2 can save a special data file with the position of the caret, wordwrap correctly set and markers

All this of course is in addition to the features that have made DeskEdit so popular among users of Acorn machines, and which resulted in glowing reviews when it was first launched a year ago. IN FACT DESKEDIT IS SO GOOD THAT IT IS USED WITHIN ACORN ITSELF!

DeskEdit 2 (disc, new manual, keystrl and quick reference card) PDE2b £31.95 inc + £2 p&p
DeskEdit 2 Upgrade Code PDEXa £9.95 inc + £2

NEW

Wimp Programming for All on Acorn RISC Computers

book by Lee Calcraft and Alan Wrigley

This new book provides programmers with a complete introduction to all the techniques involved in writing multi-tasking Wimp programs to run within the RISC OS Desktop environment. No prior knowledge of the Wimp is assumed and the tutorial style of the book will enable all programmers to understand the concepts involved and to develop their skills in writing high quality programs within the Desktop environment.

We believe that Wimp Programming for All will prove to be the definitive book on this subject for all users of Acorn RISC computers.

The book consists of ten main chapters and a number of appendices:

- Chapter 1: Introducing the Wimp
- Chapter 2: Windows
- Chapter 3: The Wimp Poll Loop
- Chapter 4: Error Handling
- Chapter 5: Icons
- Chapter 6: Menus
- Chapter 7: Redrawing Windows
- Chapter 8: The Wimp Message System, Loading and Saving Data
- Chapter 9: Templates
- Chapter 10: Printer Drivers and Outline Fonts

- Appendix A: Indirection Operators
- Appendix B: Application Resources
- Appendix C: Setting up a sprite area
- Appendix D: The Wimp Programmer's Toolkit
- Appendix E: SWI calls described in this book

To support the book there will is a **disc** containing all the programs as listed within the book, together with additional supporting applications.

Wimp Programming for All book	**Code BK12**	**£12.95** inc + £2 p&p	
Wimp Programming for All disc	Code BK13	£4.95 inc + £1 p&p	

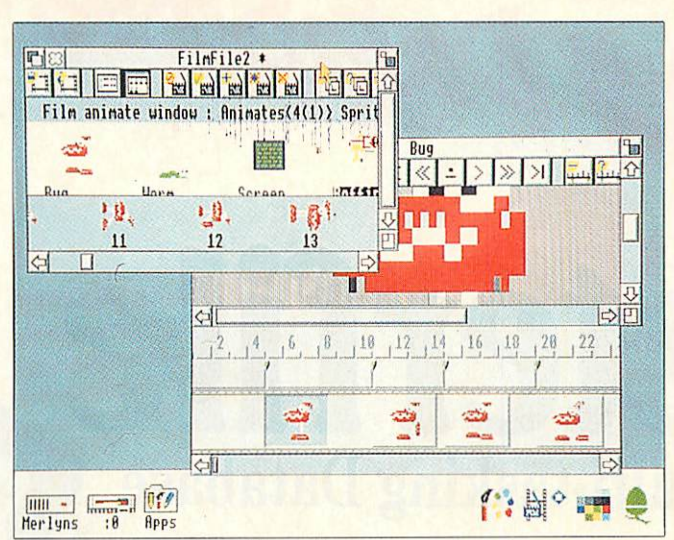
RISC Developments Ltd. 117 Hatfield Road, St Albans, Herts AL1 4JS. Tel. 0727 40303 Fax 0727 860263

MINERVA MAKES MORE OF ITSELF

MINERVA Software's new *PrimeWord* word processor, which uses Risc OS fonts, will be formally launched at the BETT Show.

PrimeWord is aimed at the low-cost end of the Acorn word processor market but, unlike *1st Word Plus* or Minerva's other budget offering, *EasiWord*, *PrimeWord* has a more comprehensive Risc OS feel, with features like support for Risc OS fonts, graphics importation and so on. *PrimeWord* includes a spelling checker and a feature that lets the user customise the program. *PrimeWord* is £59+VAT or £236 for a site license.

ProCAD is the latest computer-aided design package from Minerva and follows the launch of *CADet* at the *BAU* show last October. *ProCAD* is described as a very comprehensive and fast draughting package suitable for students. The DXF file format, widely used in PC-based Cad programs like *AutoCAD* is fully supported. *ProCAD* is £495+VAT; education price: £395+VAT.



PrimeMover is aimed at making sprite movement simple

Yet another new product is *PrimeMover*, a Risc OS compliant sprite animator. *PrimeMover* features a simple-to-understand user interface, yet it has some powerful features. For example, you can preset the path that you want a sprite to traverse and *Prime-Mover* does the rest. Minerva says the package is truly cross-curricular and has uses in areas from arts and graphics departments to sciences. A price is yet to be announced.

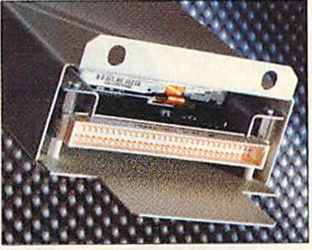
Finally, a new version of *Ancestry* – the genealogy program – has been released. An improved print preview has been developed and the anti-piracy system which required the original program disc to be present has been abandoned. Upgrades are available for £10+VAT. Minerva can be contacted on (0392) 421762.

CUMANA BUNDLES UP

CUMANA is offering potential purchasers of its CAA 740 40Mb A3000-compatible SCSI hard drive the added incentive of a cash donation of £25 to the school of their choice. The drive is £299, including 16-bit SCSI controller card. Acorn's CDFS (CD-Rom filing system) and a SCSI manager utility are included. All orders are delivered for free and will have a £25 voucher included that can be redeemed by a school of the purchaser's choice.

The first in a series of machine-specific multimedia packs based on Cumana's latest enhanced performance SCSI CD-Rom drives has been launched for Acorn-compatible computers. Cumana's £699 (including VAT) World of CD-Rom pack includes a CD-Rom drive, a SCSI interface card, utility software and six CD-Rom titles.

Cumana calculates that the total cost of the pack, if its



CD-Rom the easy way?

contents were purchased separately, would be over £1,100.

At BETT '93 Cumana will be launching its new range of faster CD-Rom drives as well as demonstrating *EasyShare*, a SCSI-based system for sharing peripherals like CD-Rom drives and hard drive with several Acorn workstations.

A new extension to *EasyShare*, *EasyPrint*, will be shown for the first time. *EasyPrint* is a utility which allows a printer to be added to an *EasyShare* network.

For more information, contact Cumana on (0483) 503121.

ACORN'S IT

PERIN'S Community School at Arlesford near Winchester recently opened its new purpose-built IT suite, housing no less than 32 brand-new Acorn A3020 Risc computers.

The school already has 30 older Archimedes computers, and all of these are to be upgraded with Risc OS 3.1. Perin's head of IT, Margaret Goodwin, said: 'Not only have IT advisors in the area been recommending Acorn's machines to us, but they are also extremely popular with the teachers because they are so user-friendly.'

Answering the oft-asked question of why computers more representative of those used in offices today, PCs for example, weren't chosen, Margaret Goodwin said: 'Because Acorn computers are at the forefront of technological development, we felt it would be short-sighted to go to other platforms that are already being left behind.'

NEWS IN BRIEF

● Public Domain (PD) software specialists, Soft Rock Software, are now offering a Freepost address for orders and enquiries. This post office facility obviously costs Soft Rock a bob or two but their catalogue prices remain unchanged.

Typical titles like *Escape from Exeria*, *Guardians* of the *Labyrinth* or *Drop Rock* are priced £3.49. Another example is *Winds of Change*, which is described as an Archimedes album, and priced at £1.99. Discounts are available for multiple orders. The new address is Soft Rock Software, Freepost (BS 7978), Westbury on Trym, Bristol, BS10 7BR.

● Is Acorn winning the home/leisure battle for recognition and to be established as a viable alternative to the Atari ST, Commodore Amiga, Nintendos and Segas? The A3010 Family Packs were certainly visible this Christmas, but *BAU* found a disturbingly high number of examples in shops like Dixons switched off instead of running demos.

Considering Dixons is supposed to be working hard with Acorn to sell the A3010, it was also frustrating to find a Dixons flyer which popped through your reporter's letterbox publicising practically everything but the A3010. We'd be interested to hear readers' views on Acorn's chances in this cut-throat sector of the personal computer industry.

● Hewlett-Packard has launched a portable battery-powered version of its popular HP Deskjet ink-jet printer. Although HP works closely with Canon on laser printers, the HP's new portable printer is not a rebadged Canon Bubblejet. HP says the new printer is completely compatible with desktop versions of the printer and even uses the same ink cartridges. Standard camcorder NiCad batteries provide power for when you're on the move. When you get back to your desk, the all-black brick-like printer unit can be slotted into a vee configuration combined sheet feeder and docking unit.

HP hasn't launched the new printer in the UK yet, but when it arrives in a month or two it should sell for around £400.

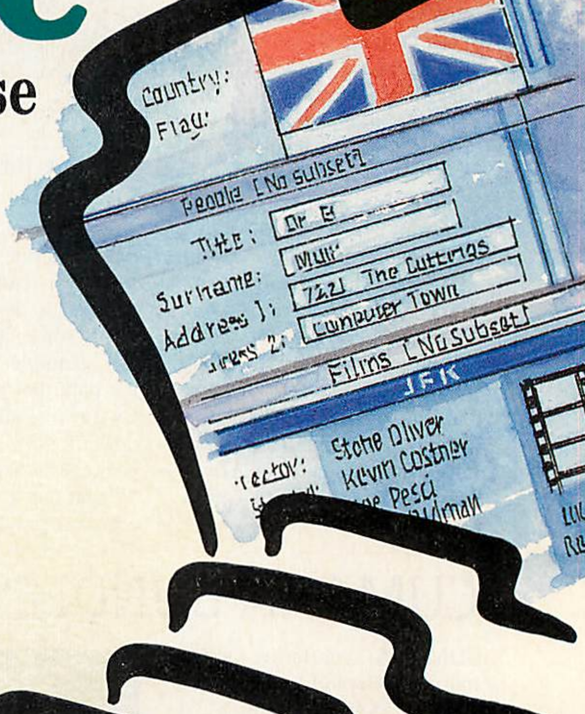
The Outstanding New Database!

VERSION 3

For all Acorn 32-bit RISC computers

Masterfile

Powerful Multi-tasking Database



Masterfile version 3 is the latest development in the best selling family of database programs for Acorn computers. It is fast, simple to use and provides powerful data management facilities suitable for home, education and business use. Included amongst its many features is a very comprehensive indexing system allowing data to be accessed in any order. In addition, subsets may be created allowing access to just those records which match the search criteria. Both indices and subsets are updated automatically when records are added, modified or deleted. The report generator allows databases to be printed in card or spreadsheet format, and provides full label printing facilities.

- Fast,multi-field indexing
- Multiple subsets
- Password protection for data security
- Global calculations across all or part of the database
- Multi-line fields
- Optional toolbox with buttons to step through records
- Calculation fields based on values in other fields
- Import text and pictures into fields by simple drag operations
- Import and export CSV, TSV and ASCII data files
- Range checking data entry
- Card designer allowing complete freedom for data entry screens
- Re-structure database at any time
- Up to 255 fields of 255 characters
- Field types include: text, integer, decimal, date, picture and calculation

Supplied with sample databases, and a user guide containing a step-by-step tutorial and reference section describing all the facilities provided.

Price **£49**
plus VAT

Available from all good dealers or direct from RISC Developments
(please add £2 carriage)



RISC Developments Ltd.
117 Hatfield Road, St. Albans, Herts. AL1 4JS
Tel: (0727) 40303 Fax: (0727) 860263

Masterfile in Education
Masterfile 3 has been designed in conjunction with IT advisors and is available at a special educational price. A site licence for 30 users is available priced £245. Please phone for further details.

A fast easy-to-use general purpose database with a superb range of powerful features at an affordable price

BUMPER BUNDLE FROM BEEBUG

BEEBUG has devised an all in one bundle based around the new Acorn A3010 called the A3010 Home Professional System. The bundle adds a monitor, extra Ram, hard drive and a selection of software to the base Acorn A3010 Family Solution pack.

In detail, the A3010 has an extra 1Mb making a total of 2Mb Ram, an internal 20Mb hard drive, a standard resolution Acorn colour monitor, *Ovation* DTP/word processor software, *TypeStudio Text Effect* software, *Pipedream 3* spreadsheet, the *Artisan 2* paint package, David Pilling's *Chess* and the *Interdictor* flight simulator from Clares.


Beebug's bundle looks like good value; and it helps schools too

An added bonus is that purchasers can nominate a school which benefits to the tune of £20; courtesy of Beebug. The pack price is £765.10+VAT, representing a saving of over £300 on the items of bought separately. A 4Mb Ram system is optional for an extra £85.10+VAT, the same additional cost Beebug asks for a much more sensible 60Mb hard drive. Beebug originally intended to close the offer at the end of January, in just a few weeks time. However due to the success of the scheme they may decide to extend this deadline. For more details call (0727) 40303.

ADDING MORE COLOUR

INTEGREX Systems has been in the colour printer business since the mid-1980s. The Derbyshire-based firm just announced its latest printer, the ColourJet Series 2. The new Integrex is a compact ink-jet printer.

Print resolution is 300dpi and a full page of graphics takes about three minutes to be rendered. Alternatively a user can swap the colour ink-jet head for a monochrome one. HP DeskJet 500C compatibility is standard and a Risc OS 3.1 printer driver is included.

The ColourJet Series 2 looks very good on paper, especially at an expected street price of around £300+VAT (the recommended price is £417). For more information, contact Integrex on (0283) 550880.



Integrex's new ColourJet looks very good on paper

POWER UP

THE popularity of hardware expansion on the Archimedes has led to a subtle problem; how to supply power to your multifarious collection of podules and hard discs. Ray Maidstone can now perform the necessary modifications to a certain PC 'tower case' so that it can house virtually any Acorn 32-bit machine and hide it out of harm's way under your desk.

The case measures 19in tall by 16in deep by 7in wide and can hold three half-height 5.25in drives, three 3.5in hard drives and two 3.5in floppy drives. It would be possible to fit further drives into the base of the case, but this would require extra anchor points.

Four full width podule blanking plates adorn the back of the case but, as yet, only the standard backplane is used. Ray is currently working on the necessary hardware and software to allow up to eight podules to be supported.

Power comes from a new 240 Watt supply, and a good chunky rocker switch turns the power on or off for your whole machine. For further information, contact Ray Maidstone on (0603) 400477.

NEWS IN BRIEF

● Icon Technology is to follow up its successful *EasiWriter* and *TechWriter* word processing packages with a low-cost entry-level version of *EasiWriter* called *StartWrite*.

The new package will be introduced at the BETT Show in January and is aimed squarely at the primary education market.

Included with *StartWrite* will be a new font that is specially designed for primary school use; and it's even called Primary. Icon is also hinting that it will be offering special show discounts on all its products during the show.

For more information on these products, contact Icon Technology on (0533) 546225.

● At the forthcoming BETT show, Widgit Software is to unveil *Choices*, a framework program that is designed to encourage children to explore decision making and the selection processes involved.

The program relies on a large library of still and moving images that children can manipulate logically on the screen using a mouse, the keyboard or other input devices like an overlay keyboard or joystick.

Widgit says that the software has uses not just in mainstream primary education but also in the area of profound, multiple and severe learning difficulties. *Choices* will cost £35+VAT and it is compatible with most Acorn Risc computers.

Other new releases from Widgit include *Trilinks* which allows teachers to link exercises from *Choices*, and other Widgit programs like *ScreenPlay* and *GridIt*. There's also a new curriculum support pack called *Vikings* that explores Norse history. For more information contact Widgit on (0926) 885 303.

● Two key product launches at BETT can be expected from Northwest SEMERC. The first is *My World 2*, an updated version of the popular framework program that was produced by Derbyshire's Educational Support Centre.

Enhancements include the ability to re-size and link objects together 'magnetically' as well as pass them through to other screens by clicking on them.

PROTECT YOUR KEYBOARD

WITNEY-based Naltex Inpace Ltd has added Acorn-compatible products to its range of fitted polyurethane keyboard 'gloves'. This transparent flexible plastic skin is aimed at users who unavoidably expose their keyboards to excessive dust and grime or the risk of liquid spillage. Naltex says its keyboard gloves are very soft and malleable but at the same time tough enough to resist punctures, tears and abrasion in normal use. Unlike previous keyboard protection products which used PVC-based materials, Naltex says its products are not prone to becoming brittle and so cracking. For further information contact Naltex on



Caption

RISC DEVELOPMENTS

A NEW range of Ethernet cards will be shown for the first time at the BETT Show later this month. Versions for most Acorn Risc computers bar the A4 will be shown. Compatibility with Acorn's new AUN networking standard is featured. Some cards will offer a choice both 10Base2 (cheapernet) and 10Base5 (full Ethernet) connectivity. An A3000/4000 card is planned to include an analogue port, User Port and Econet which can be combined with an Ethernet card in a A3020 or A4000 to turn that machine into an AUN gateway station. Risc Developments says its new Ethernet cards are unique inhaving all necessary software on Rom thus eliminating the need to boot from floppy disc.

A very compact and cool running 4M Ram upgrade for the A3010, priced £129+VAT, has been unveiled by Risc Developments. The card measures just 70x55mm and contains eight 4Mbit low power Ram chips. The design is well within the power and signal constraints of the A3010 hardware according to Risc Developments.

Risc Developments hasn't forgotten about the large numbers of older Acorns out there and an interesting new range of 8M Ram memory expansion solutions for the A400 or R140 is the result. The upgrades consist of two small boards which can be user-fitted. The smaller of the two boards fits into the MemC Socket while the second larger one plugs into the operating system Rom sockets. The displaced OS Roms plug into the second board which doubles as a Risc Os 3.1 Rom socket carrier board for older machines. Both boards are linked by a cable. Upgrades for 4M machines are priced £479+VAT, for 2M machines the price is £509+VAT and for 1M machines £569+VAT.

● Masterfile has returned. Originally released for the old BBC Micro, Risc Developments has developed a completely new database system specifically for the Risc Os bearing the once-familiar Masterfile moniker. Masterfile 3 is described as a fast and simple to use database system for home, education and small business users. Features include a fast indexing system and a subset system for more detailed search parameters. Indexes and subsets are automatically updated when records are added, modified or deleted. A versatile report generator completes the picture. Risc Developments has continued its policy of very low pricing with Masterfile 3, which is priced £49+VAT. Users of any earlier versions

SPRING SHOW

Plans are now well underway for the new *BBC Acorn User* Spring Show, to be held in Harrogate in April.

Already many of the major players in the Acorn market have booked stands space, including Acorn themselves, who will have a strong presence at the show.



The show is within easy striking distance of many major cities and will be the biggest Acorn event held in the north of England.

Geoff Potter, from Safesell Exhibitions said of the new location:

'For many users, the Spring Show will be their first chance to sample the full extent of the Acorn market. We think that the show will be a great success, and hope that it will grow and develop.'

Dates for the show are 15 to 17 April at Harrogate International Conference and Exhibition Centre. For more details on stand space or tickets for the *BBC Acorn User* Spring Show, contact, Safesell Exhibitions on (0737) 814713.

NEWS IN BRIEF

● Optima is a new product developed by Northwest SEMERC's Deputy Director Paul Nuttall and Simon Hayles of 'Moving In' fame. With Optima you can construct adventures using a mouse to choose illustrations from a library, like a space hypermedia database for example. Textual annotations can be entered and sized to the users' liking and other resources like sounds can be linked to appropriate objects. Screens can be linked to make something analogous to an electronic book. Contact NW Semerc: 061-627 4469.

● Techsoft has computerised embroidery with its latest product Poem 500. This is a computer controlled embroidery machine which can be controlled by an Acorn computer using Techsoft's Arc Embroidery software. The idea is a bit like graphics printing - you create your design in a !Draw file format and the



machine embroiders the pattern directly onto fabrics. All control is via the computer and a 90x90mm working area is provided. The system sounds ideal for creating patches, badges and emblems. Poem 500 with Arc Embroidery software is priced £749+VAT. Techsoft: Tel.082 43 378.

● Those of you who were glued to the box over the holiday period, no doubt noticed the Acorn presence on Gamesmaster, the computer games show. Linford Christie and 'Carl Lewis' were competing in a special panto edition of the show. Acorn plan to step up their TV presence this year so stay tuned . . .

● Do you have a problem with Risc OS 3 since you made the upgrade? If so we want to know about it. Can't get that old printer driver to work? Found a problem with the new functions? Whatever it is, write to us at: Risc Problems, BBC Acorn User, Redwood Publishing, 101 Bayham Street, London NW1 OAG.



ICON DESIGN WITH ARTWORKS

WITH the advent of Risc OS 3 and the trend towards high-resolution displays, icon design has become a mini art-form. When the Archimedes first came out, way back in 1987, the 'high-resolution' desktop was seen as nothing short of revolutionary. Now, Mode 12 is looked upon as distinctly low-resolution, and high-resolution modes such as Mode 31 are seen as the norm in top-end models.

A new standard in Risc OS 3 dictates that there should be three sets of icons supplied with any application. These are for: medium resolution modes (*!Sprites*); high resolution colour modes (*!Sprites22*); and high resolution monochrome modes (*!Sprites23*). It should be noted that the numbers in each file name refer to the aspect ratio of the pixels in the mode(s), and not to the mode number itself.

Designing icons for medium resolution modes is quite a skill in itself, with curves and circles being particularly difficult due to the 'elongated' pixels. Anti-aliasing has to be used if you want a 'smooth' look to a line, although the small number of colours available means that you have to stick mainly to greys.

Designing icons for high-resolution modes is a different matter entirely. Curves are relatively easy because of the 'square pixels', although you now have twice the number to fill up. Dithering works well in high resolution modes and effectively gives you a much larger palette.

Although icons are bit-maps (made up of pixels), I find the easiest way to create them is with *Draw*, or even better, *ArtWorks*. The following steps should be taken to create a standard hi-res icon (ie. Mode 20, 34x34 pixels):

1) Draw your 'icon' (using *Draw*, *ArtWorks* etc.) at any size you want, using any colours you want, regardless of the mode you are using.

2) Create a Mode 20 sprite (34x34 pixels) in *Paint* of a black outline on a white background and merge this with your icon in *Draw*.

3) Scale the 'icon' down (making sure that all objects are grouped together first) so that it just fits in the black outline.

4) Switch the desktop to Mode 20 and using the 'Snapshot' facility in *Paint*, grab the icon as a sprite.

You should now have an icon. It can be touched up in *Paint* and cut down in size if necessary. If you are using *ArtWorks* to create the icons, you'll be able to use the extra benefits of automatic anti-aliasing and dithering.

● Art on the Archimedes need not be expensive. For the price of a blank disc or a short telephone call, you can have access to a wide range of painting and drawing applications, plus lots of clip art.

Public domain (PD) software is available from a number of different sources, including bulletin boards and PD libraries. The Arcade bulletin board, for example, has four special sections in its file area, all connected in some way with graphics.

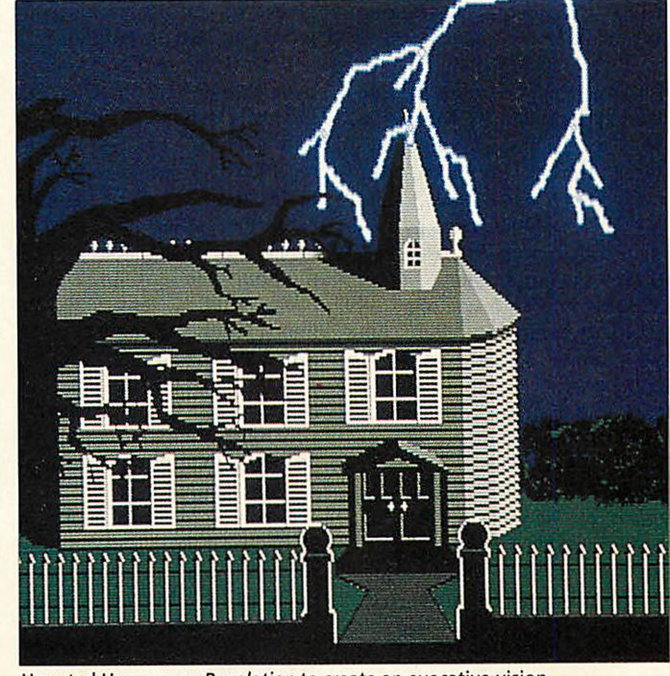
They are DTP Examples/ Utils, DTP/Art Fonts, Archimedes Graphics and GIF & other pictures.

ACORN USER PICTURE OF THE MONTH

THIS MONTH'S picture is *Haunted House* from John Stephenson. John used Longman Logotron's *Revelation Image Pro* application to create this rather effective art work. Three pieces of crisp, blueish paper will be winging their way to Cumbria for John's effort.

If you have any pictures that you think are worthy of the Graphics Page 'picture of the month' title, please send them in on disc with a step-by-step explanation, telling us what piece of software you used to draw them and how they were created. Discs should be sent to the following address:

Readers' Art
The Graphics Page
BBC Acorn User
101 Bayham Street
Camden Town



Haunted House uses *Revelation* to create an evocative vision

NEWS IN BRIEF

● Computer Concepts' desktop publishing package, *Impression 2*, has now been improved to incorporate full compatibility with their other professional title, *ArtWorks*. Rather than converting *ArtWorks* files into *Draw* files before loading them into Impression, they can now be dropped directly into documents.

This means that they retain all their 'attributes' such as blend information and so on. If *Impression* and *ArtWorks* are run side by side on the desktop, then *ArtWorks* pictures can be dragged directly from *Impression* to *ArtWorks* for editing.

Version 2.18 is available as a straight upgrade to all owners of *Impression 2* and can be obtained in the usual way. Further details are available from Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts, HP2 6EX. Tel: (0442) 63933.

● Graphics cards are fast becoming one of more popular add-ons for Archimedes. Arxe Systems has teamed up with Patrick Arnold (who designed the Serial Port PCATS Graphics Enhancer card) to produce a range of low-cost graphics cards, starting at a seemingly very cheap £99.95.

Two cards will be produced; the cheap model that is designed purely to extend the palette, and a fully-fledged 24-bit frame store, which should retail around the £300 mark.

Prototype boards were being produced as *BBC Acorn User* went to press, and both cards will be demonstrated at the BETT Show at Olympia. Further details can be obtained from Arxe Systems, PO Box 898, London, E7 9RG. Tel: 081-534 1198.

● Now there is a new way to contact the *BAU* Graphics Page. Do you have some news, views or even an ususual graphics tip? Do you also have a modem? If so why not contact Rob Miller via the Arcade BBS, user #1144. Arcade is on 081-654 2212 or 081-655 4412. But a word of warning: if using Arcade, please keep it to just messages. Any large files, such as pictures should be sent on disc to the normal address, given on the left.



NORTHERN ODYSSEY FOR THE ARC

ODYSSEY bulletin board is located in Beverley, North Humberside and operated by James Willmott. Although running on a PC with *RemoteAccess* BBS software, Odyssey caters for those with interests in a range of machines, from Atari, Amiga and IBM PC, through to BBC micro and Archimedes models, each with message and download areas.

Odyssey is the official Acorn support site for the north-east, carrying the usual support sections, and the PD filebase has a good selection of file download areas for BBC and Acorn machines, including applications, utilities, demos and games. There is no subscription charge, and free access is given to all Echomail and matrix Netmail facilities including the Archimedes and BBC FidoNet echomail conferences.

Other interests covered include Satellite TV, Star Trek, online games, space exploration, Midi and music, international messaging between Australia and the UK, the US and Europe, networking and viruses.

In the coming year ,James hopes to add another line to the system and expand the online software base by installing a CD-Rom drive chock-full of public domain software. Odyssey BBS is on (0482) 870919, at 8N1, and runs on all speeds from V.21 to V.32bis and HST.



A Christmas welcome from Odyssey BBS

USING THE V-WORD

COMMS is an area where jargon breeds unchecked, so here are some of the more recent V-words explained. The V series recommendations are drawn up by the French-named CCITT.

V.32 is a data transmission standard that uses a bi-directional communication speed of 9,600 bits per second (bps), meaning full-duplex. V32 modems automatically fall back to 4,800bps if the line quality becomes poor, and forward again to 9,600bps when it improves. Error correction and negotiation are built-in.

V.32bis extends the V32 range to include 7,200, 12,000 and 14,400bps. V32bis modems will fall back to the next lowest speed if there is line noise, and forward to the next highest speed when the line clears. To use V32bis, the computer-to-modem speed must be at least 19,200bps; tricky with Risc OS 3.1.

V.42 is an error-correction standard that copes with phone line noise by automatically retransmitting data that is corrupted during transmission. Although similar to the MNP4 standard, V.42 uses a better protocol called LAPM, but is compatible with MNP4.

MNP (Microcom Networking Protocol) is the name given to various levels of the error correcting and compression standard created by Microcom Inc., a US modem manufacturer. Levels 1 to 3 have error correction capabilities, and levels 4 and 5 add performance increases, offering real-time data compression.

V.42bis is a data compression standard similar to MNP5 but with about 35 percent better compression. V.42bis analyses each block first, compressing the data only if a benefit will be gained. V.42bis is *not* compatible with MNP5, but will make an connect with an MNP5 modem because V.42 is included in the V.42bis specification, but only error-correction to MNP level 4 will be used. For BBS use, V42bis is strongly recommended.

TWO PORTS ARE BEST

West Country firm, The Serial Port, has developed a low-cost high-speed communications port expansion card that also gives you the use of a second serial port into the bargain.

Each of the two ports has its own 16-byte data register that greatly extends the reliability with which the card can receive data while operating under Risc OS 3.1; theoretically the Serial Port card is capable of a maximum transmission speed of 1152 kilobaud. This is ten times the transmission speed that is achievable on a PC.

The Serial Port's expansion card fits all Acorn A300/400/540/3000 and 5000 machines and costs £69+VAT including software support.

For more information on the high-speed dual-port comms card, you can contact The Serial Port at Burcott Manor, Wells, Somerset BA5 1NH, Tel: (0749) 670058. Fax: (0749) 670809.

NEWS IN BRIEF

● Miracom is dead; long live U.S. Robotics. Miracom has changed its name following final full acquisition of the company by the Skokie, Illinois-based U.S. Robotics Inc. The change is intended to reflect the company's broader-based capability in data networking and shared access communications.

Modems still feature significantly in the product range though, and following on the release of the new smaller 16k8 bps Dual-Standard, is the announcement of a £95+VAT upgrade for existing DS Courier modems (with front panel button) to include Group 3 Class 1 Fax operation. U.S. Robotics Ltd is at 224 Berwick Avenue, Slough, Berkshire SL1 4QT. Tel: (0753) 811180.

● Competition to our *BAU* column appears this month in the form of Pandora's Box BBS Magazine, devoted to BBS users and software enthusiasts everywhere. The non-profitmaking printed A5 magazine intends to offer reviews, news and gossip at a £4.00 annual subscription for six Bi-monthly issues. Submissions are invited for articles or reviews up to 1000 words, and sysops are offered free advertising space on application to DragonFire BBS on 0628 74179 (7pm-8am) or Voice during office hours. Pandora's Box BBS Magazine's contact address is at: 40 Laburnham Road, Maidenhead, Berks, SL6 4DE.

● New BBS on the line is The Plasma Sphere, run by sysop Keith Hall in Lymm, Cheshire. He has an Arm3-equipped A410 running Carl Declerck's *RISCbbs*, with over 700 files in 228Mb of online storage and 24hr support for speeds 300-2400 MNP5 8N1. The Plasma Sphere BBS is on 0925 757920, and is FidoNet node 2:250/219.0.

● YOU can contact me with any news or information you'd like to be included on the Comms page by writing to: David Dade, BBC Acorn User, 101 Bayham Street, London NW1 0AG or by modem on Arcade BBS, User #2 – Tel: 081-654 2212 or 081-655 4412

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DATAPOWER uses built in compression, and a state of the art file structure, to ensure that your Datafiles are not only small to store, saving you disc space, but they are also very FAST to access.

DATAPOWER comes with a full set of examples, including all those shown here, and one that shows how it can be used for logging IT SAT's, that even generates the pupil reports.

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See us on Stand 446 at BETT '93

School order forms welcome

SCSI CD ROM the collections from Morley



Morley Electronics are pleased to announce their new CD ROM bundle for the Acorn ARM powered range of computers. The system comprises of a Morley 16 bit SCSI card, a high quality externally cased CD ROM drive, a set of stereo speakers all cables necessary and a choice of four different collections of CD ROM discs.

The CD discs themselves are all RISC OS format and require no use of a PC Emulator whatsoever. They range from a disc which is crammed full of clip art to an encylopeadia of bugs, slugs and insects with full motion video clips in Acorn !Replay format.

The information on all of the discs can be accessed directly or if desired exported for use in other software. For instance the sound samples on the Grooves disc can be exported straight out to music packages for re-arranging.

The Collections

INCLUDED AS STANDARD
- CD ROM Mechanism
- 16 bit Morley SCSI Card
- All Cables
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COLLECTION 1
- Grooves
- Creepy Crawlies
- Image Warehouse

COLLECTION 2
- Grooves
- Creepy Crawlies
- Image Warehouse
- Hutchinsons Encyclopedia

COLLECTION 3
- Grooves
- Creepy Crawlies
- Image Warehouse
- D.O.L.W.

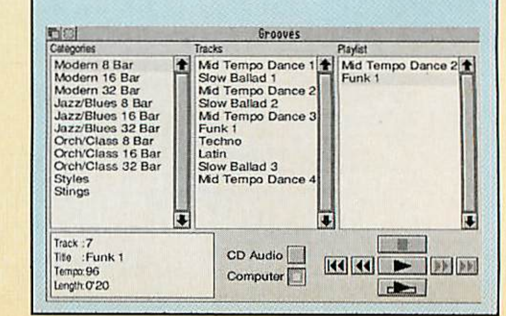
COLLECTION 3
- Grooves
- Creepy Crawlies
- Image Warehouse
- Hutchinsons Encyclopedia
- D.O.L.W.

Grooves

This is a unique music CD ROM featuring 100 professionally created clips of music. The music varies from classical to funk and the majority of clips are available in 8, 16 and 32 bar samples. The pieces themselves vary from short presentation strings or "musical dingbats" to compostions lasting one and a half minutes.

Using appropriate music software it is possible to build creative 'tunes' demonstrating different musical styles. All the clips come in ready to use formats and users can preview the tracks by using a special application in which an animated jukebox selects and plays the audio versions of the clips.

All samples can be exported as Sound Samples, Modules or as !Replay sound file. All are royalty free for non-profitable use.



Creepy Crawlies

A complete world of bugs, beetles and spiders engulfs the screen right in front of you. This new disc produced by Media Design Interactive has been formed specifically for the RISC OS format.

Offering an exciting introduction to the fascinating biology of these creatures. The information is in the form of text, pictures, narration/voice over and !Replay video material produced by the worlds leading biologists. A very useful feature is that the text descriptions can be set to display for either Key Stages 2/3 or 1/2.

Text, Sprites, !Replay frames and narration can all be exported directly for use in other programs.



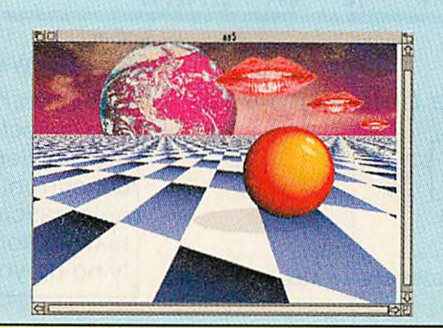
Image Warehouse

The colour Image Warehouse is a vast selection of professionally created high quality images ideal for use in DTP, presentation and artwork in general.

The warehouse consists of five main sections as follows:

Artwork
Scans
Textures
Clip Art
Backgrounds

All images are in Sprite format in large and small Modes 15,28 perfect for use on all Acorn computers and monitors from the A3000 upwards. All are royalty free for non-profitable use.

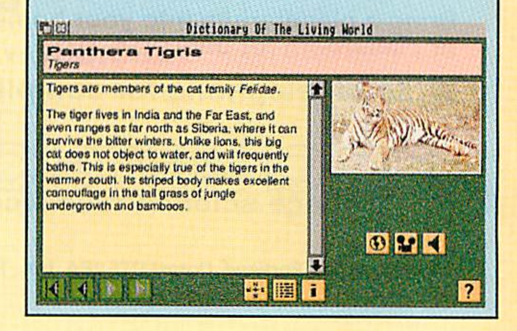


Dictionary Of The Living World

This multimedia encyclopedia of Life on Earth incorporates text, pictures, sound, and !Replay video scenes. More than 2500 text entries are supplemented with over 1000 pictures, 100 animal sounds and 100 full motion video clips.

When a small picture such as the one below appears, the user simply double clicks in the picture and it is immediately displayed full screen in full 256 colours.

Ideal for educating students from 10 years upwards the Dictionary of the Living World can teach about the biology of life. All of the sprites and text files can be exported for later use and the !Replay video files can also be shown in isolation.



Hutchinsons Encyclopedia

This exciting CD ROM version of the Hutchinson encyclopedia is an up-to-date reference for vast amounts of informations available in seconds.

The package is fully RISC OS compliant and has over 25,000 entries and 7,500 biographies listed in its information. Searches can be carried out quickly and easily and then the results fine tuned even further by allowing further searches to be carried out on those that were successful from the first.

A very useful feature of the software is that all text and sprites can be exported from the software for use in projects or reports that you might be working on.



Individual Prices

CD ROM Collection 1	£649.00
CD ROM Collection 2	£729.00
CD ROM Collection 3	£769.00
CD ROM Collection 4	£849.00
CD ROM drive (External)	£439.00
CD ROM drive (External) & SCSI interface	£489.00
CD ROM drive (External) & cached SCSI interface	£539.00
CD Caddy	£6.25
External Loudspeakers	£21.28
RISC OS CD ROM DISCS	
Creepy Crawlies	£99.00
Grooves	£59.00
Image Warehouse	£59.00
Dictionary of the living world	£175.00
Hutchinsons Encyclopedia	£99.00
Frontier 2000	£175.00
Revelation 2	£139.00

CD ROM collections are suitable for all Acorn computers with 16 bit expansion slot. Some CD discs require 2MB RAM minimum and a multiscan monitor is recommended. All prices exclude VAT and carriage. E&OE Specifications subject to change. All trademarks acknowledged.

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LBP-8 Toner & Drum	£ 65-00
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BJ10ex, driver & lead	£ 249-00
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Item	Price
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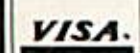
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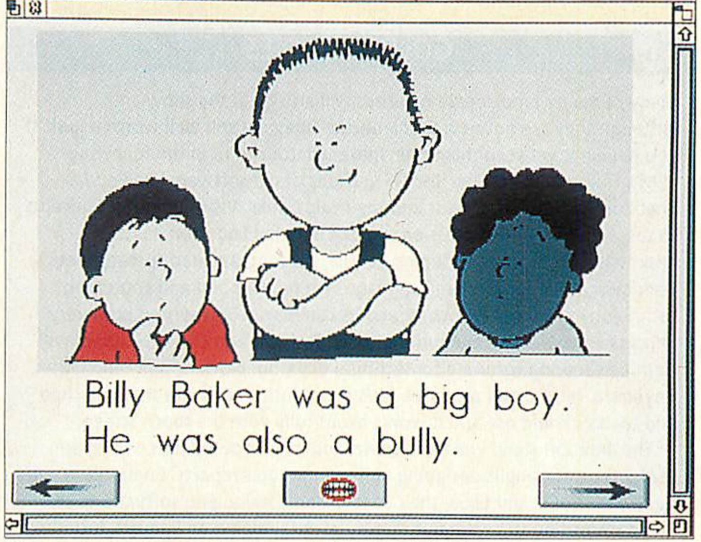
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AIDING AND A-BETTING

The best thing about the Bett show is spotting the new releases. Clare Johnson suggests 20 new things to see at Bett

If you're a busy teacher who has found some spare time to visit BETT 1993, this year held at Olympia, then there's plenty for you to go and see. Last month we gave you an overview of the entire exhibition but for the real Acorn watchers, the big thrill is spotting the newcomers.

There are plenty of new releases at this year's show, but for those who want a helping hand here are some of the *BAU* selection; 20 new products to see at Bett.



Sherston's Naughty Stories gives children the right ideas

1 Oak Solutions is showing new products produced using the *Genesis* authoring package, mainly aimed at the history National Curriculum. They cover topics such as Investigating Local Industry using Abbeydale Industrial Hamlet as a case study (KS1,2 and 3); Viking Invaders (KS 2 Core Study module) and Cistercian Abbey (KS 3).

Oak is also introducing *Letters,* which is an application for very young children learning to write (KS 1) and *Primary Nature,* which will cover pond life, hedgerows and food chains for the science National Curriculum requirements.

2 4mation will be showing its new version of an old favourite, *Granny's Garden*, written for Risc OS machines and *Noot*, a new animation package that lets toys in a cupboard dance and sing, and animals in a farmyard make all the right noises.

3 Iota software will be showing its new database software *Datapower*. It has a number of good features. The current version allows access over a network, and Iota programmers are working hard to produce a client server version of the software to allow multiple access to a single file; very useful in a school IT room. See our review on page 115 for more details.

4 Cambridgeshire Software house will be showing the CD-Rom version of its very successful *Frontier 2000* software. We look at this in more detail on page 38. *Gemini*, a primary program designed to allow children to play at matching pairs will also be on show. This uses mixed pictures and words games which can be tailored to a child's needs.

5 Clares is showing its new *Topographer* software which allows pupils to draw maps using standard ordnance survey symbols and markings. The computer then simulates 3D views of the area that has been drawn. Where you stand on your map is up to you. The company is also showing *ProArtisan 2*, with a number of new features such as new tools, colour density, mono conversion and embossing.

6 Colton software promises to have the final version of the *Wordz,* word processing package on sale for the show. This package was previewed in last month's *BAU*. The company is also showing previews of the second in the family, *Resultz*. This is a spreadsheet package, with full graphics facilities, which no-one has seen yet.

7 Visit Computer Concepts to see the new colour card reviewed in last month's issue. The Colour Card allows full use of the power of the highest resolution monitors, with vastly increased colours, better speed and less flicker.

I can't pretend to have understood all the technicalities, but it looks most impressive and schools will find it extremely useful if they want to do full-colour DTP on one or two machines. Talk to CC about photo-CD and your *Impression* documents.

8 If you plan to do room design in your technology lessons visit Explan and see *Spex*. You can design a kitchen with windows, doors, furniture, wall covering and then look at it in 3D. It appears easy to use but go and judge it for yourself.

9 If you've used and enjoyed Minerva software's *PrimeArt*, you will want to see the two new packages in this series; *PrimeWord*



and *PrimeMover*. The first is an easy to use outline font wordprocessor, which is definitely worth investigating for KS1 and 2, and the second is an animation package. See this month's news pages for more details.

10 New on the Lindis stand will be the new release of *SCSI Share* which allows several different machines to share hard discs, CD-Rom drives and printers. For those who have not yet seen the presentation package, *CableNews*, this will also be on show plus the latest addition to the Presenter range, *Presenter GTi*. *Cablenews* was reviewed in December *BAU*.

11 Elsewhere in the show you will find other well-known names. Sherston software always produces packages that teachers love and this year is no exception. *Badger Trails* is a multimedia package aimed at KS2, and allows pupils to experience life as a badger; seeing, feeling, hearing, smelling and tasting. *Splash*, advertised as 'the cheap and cheerful art package', combines some of the best features of *Draw* with painting tools.

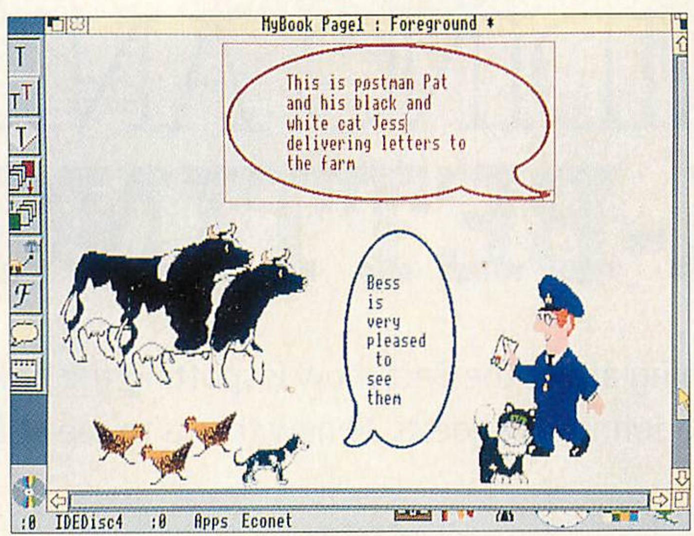
My favourite is going to be *Naughty Stories*, though. Read and hear about Billy the Bothersome Bully and the other five stories in the series with your KS1 and KS2 pupils, especially those with reading difficulties. And take away the discs on 28 days approval.

12 The ESM stand is always busy and this year they will have the new *Time Traveller* software packs available; covering KS2 and 3 history core topics such as: The Victorians; The Making of the United Kingdom; Britain since the 1930s. There will also be a chance to see two brand new packages; *Seelinks*, a primary data handling package and *Worldmaker*, a modelling package that covers level 4 and above modelling strand statements in AT5 of the technolgy document.

13 When we finally know what the KS4 requirements for IT are to be, we'll need software that simulates a variety of systems. Keylink computers will be showing *TOM*, a computer simulator. *TOM* stands for *Thoroughly Obedient Moron* and is designed to teach the fundamentals of computer operations.

14 Appian Way has made many changes to the *PictureIt* and *FindIt* drawing and datahandling packages. The first I loved; I can't draw and a number of topic packs are available with pre-drawn shapes to make it easier to produce something worthwhile.

The second is one of the best KS1 and lower KS2 datahandling packages I've seen yet. It's nice and easy to use, and keyword entry helps greatly with spelling problems. We take a closer look at *Picture It* on page 35 of this issue of *BAU*.



Keyboard's Bookmaker lets you put Postman Pat in his place

GOLDEN OLDIES

Many of my own personal favourites will also be at the show and, although they are not new Bett launches, they are still well worth a look. If you have not yet seen them then make a detour to fit in the following: ESM's Folio range and the Risc OS versions of old software like *Podd*. Sherston's *Crystal Rainforest* and the *!Help* books. Visit Computer Concepts to see *Artworks* and *Impression Junior*. Longman Logotron has an impressive list of titles, including *Eureka*, the long-awaited spreadsheet, *Pendown Etoile* for Modern Language writing, *Pinpoint* and *Logo*. Icon technology produces *Easiwriter* and its compatriot *Techwriter*, both very impressive publishing and writing tools. Techsoft and Linear Graphics will both be showing software for technical drawing, plotters, mills and lathes. Keyboard Technology produces *1stPaint;* painting software that any child and teacher could use and it works beautifully with the touch screen.

The 4mation stand will have *SmArt* and its associated files, which are useful tools for pupils designing and writing topic reports. Commotion will have both *CoCO* and *CoSe*, their control and datalogging software to try. Philip Harris has an impressive display of datalogging equipment, including remote data collection devices. Looking for different fonts? Then visit the Electronic Font Foundry stand. And if you run a network or have hard discs in your machine, find out about Pineapple's virus protection. Finally, please do not on any account walk past the *BBC Acorn User* stand without popping by for a chat with the team.

WHEN AND WHERE

The BETT '93 show takes place at the National Hall, Olympia, London on the following dates:
Wednesday 20th January 1993 10am – 6pm
Thursday 21st January 1993 10am – 6pm
Friday 22nd January 1993 10am – 6pm
Saturday 23rd January 1993 10am – 4.30pm
For further details call the BETT hotline on 071-831 1526

15 Topologika will be demonstrating the *Screen Turtle* software the company has been working on and all the *Freddy Teddy* software, among other things.

16 I'm looking forward to seeing the final version of Keyboard Technology's *Bookmaker* previewed in last month's *BAU*.

I hope to be able to finally place Postman Pat outside the post office with Granny Dryden and Jess, all properly to scale, with speech bubbles coming out of their mouths in full colour. Then turn the pages and read the story. It looked impressive during its development and I think all KS1 and 2 teachers will find it worth a glance.

17 If you are interested in electronic communication, visit the Times Network, which will have Risc OS machines logged on to the French Teletel system, downloading weather satellite images and the daily news in French, Spanish, German and English. You can also see the *Times* CD-Rom running under Risc OS.

18 Don't forget to visit the Special Needs village and see the new software available from software companies like Widgit and Brilliant Computing. NorthWest Semerc has the new version of *My World* on show, along with the 20 plus discs available to run with it, covering an enormous amount of the curriculum. Much of the software in the village has a great deal more to offer than just special needs and I would recommend that all KS1 and 2 teachers pay it a visit.

19 Almost last, but not least, the Acorn stand will be showing off the new DIY Replay, and there may also be one or two unexpected bonuses for Replay fans.

20 And that's not all. There are certain to be some other new things around so keep your eyes peeled and enjoy all the software and hardware on display at what promises to be the biggest BETT yet.

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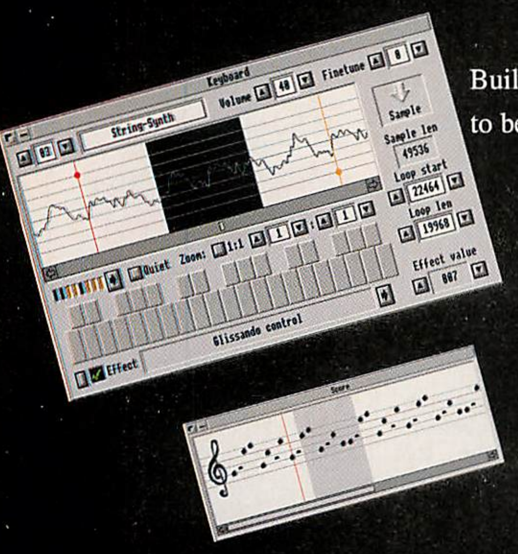
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SCSI Share packs are available from a range of suppliers as well as direct from Lingenuity.
*Based on a 6-station CD ROM pack costing £1854

Digital Symphony

The Definitive Soundtrack Editor

At last, a SoundTrack Editor Package, that is as Powerful as the Archimedes itself.



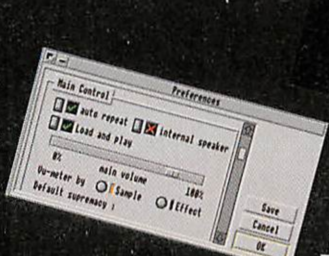
Built in Sample Editor, allows samples to be tailored to requirements.

Pattern editor allows part of a pattern to be Cut, Pasted etc, as well as showing what is happening on the other channels. Effects and instruments are set by simply Selecting, Pointing and Clicking.

Score allows track to be diplayed, using Standard Musical Notation.



Overall control of Symphony is gained using, the Control and Preference Windows.



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The Professional Data Management System

Archivist

Cards are created with the Designer part of the package, a new form can be designed simply by selecting fields, and dragging them to their required position.

Text, Integer, & Real field types can be set,in addition to multiple format Date fields, and Formula fields with user definable equations.

Alterations, for example - extra fields can be added to a card, even if you have started imputing data, and no data will be lost.

Archivist is able to Store and Display or Play Textfiles, Sprites, Drawfiles, Maestros, Samples and Soundtracks.

Archivist can be interrogated using either of two search routines, Easy Search gives you a duplicate copy of the card, you type the variable to be searched for in the appropriate field, and Archivist does the rest.

For those requiring a little more flexibility, a complex search equation can be built up using mathematical, and Basic Operands.

Archivist of cause, also provides a Search and Replace facility, plus a fast Primary & Secondary Sort routine.

A Clipboard, allowing cut and paste operations, and a user definable Quick Entry routine, speeds up data entry into Archivist considerably.

Card Print allows printing of cards in WYSIWYG format, using of course the standard Outline fonts. (2 supplied)

Reports generator, allows your data to be presented in a tabular form. Archivist also has a specifically designed Label Printer for your Names and Addresses files.

Archivist files are saved compressed to save valuable disc space, and with a Password for privacy if required.

Archivist can automatically produce CSV files, with the option to create Graphbox headers. Also it is possible to save data as a textfile for export to DTP's etc.

Statistics window displays the Averages, Minimums, Maximums and Totals of each field for the entire database.

Archivist is able to Import files from many existing databases, on the Archimedes, as well as the BBC and PC.

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Existing users can upgrade to ver 4.40 for just £5, when returning the original disc.

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Photo: PETER DAZELEY / Ill: GEORGE SNOW / Model: POLLY GORDON

Richard Garrett is your guide on a voyage through the world of computer music

FACE THE MUSIC

Attention, please, ladies and gentlemen, we are about to enter the world of music technology. Since you're reading a computer magazine, we will assume that you have no irrational fears of technology, but if you're slightly put off by the sight of staves, piano keyboards and the esoteric paraphernalia associated with musicians: don't panic.

As with computer-based art, computer music is about using technology to develop self expression with less dependence on physical techniques required by traditional methods. It's not that ten years on the road with Frank Zappa or playing in the London Philharmonic wouldn't help; it's just not essential.

Since the early 1980s, when computer music first crawled out of academia, its effect on popular culture has been remarkable. When you turn on the telly and watch the latest thriller or advert, chances are that the signature tune was composed on – and probably played by – a computer.

Over the next few issues, this series will discuss the different ways that an Archimedes be used to make music, write music and control electronic instruments. This month, we start with alook at all the musical hardware on offer and some of the different programs that could run it.

Like any other computer activity, music making is a three-stage operation. First, an input device converts real-world events into a digital form. Then, you use the computer to process the data. Finally, an output device changes the processed information back into something that can be appreciated by human beings.

With music, particularly Midi, the output stage (or the processing, depending on how you view it) is split into two as the computer sends digital control signals to electronic 'tone generators' which, in turn, produce analogue audio signals that can be recorded on tape or played through loudspeakers.

The cost of hardware required to work with music on the Archimedes can run from a few quid for a cable that connects the audio socket to your hi-fi, through to many thousands for 'professional' keyboards, samplers, laser printers and audio equipment.

Midi and recording gear may appear expensive at first sight, but bear it in mind that this equipment is the audio equivalent of the printers, scanners and digitisers used elsewhere in computing.

The following article is an introduction to the huge world that is computer music: next month we will really get down to the nitty gritty of real-life music makers . . .

INPUT

At its simplest, music needs no special input device. As anyone who has ever used *Maestro* knows, it is possible to sit at the screen and place notes on a stave with just the QWERTY keyboard and the mouse, but it is generally useful to have a rather more musical interface.

Most input devices used in music are Midi 'controllers', of which the most common is a keyboard which works like this: When a note is played, the keyboard tells the computer what key was pressed, how hard you hit it, and when and how fast you let go. Although some keyboard controllers have no onboard sounds ('mother keyboards') most are synthesizers or sample players in their own right.

As a input device, your choice of keyboard depends on playing ability. Cheaper models have only a few dozen keys that turn notes on and off with little attention to technique, while more expensive devices encompass 61 to 88 notes and have weighted keys that feel like an acoustic instrument. Prices can range from around £100 for Casio home units, through to professional models like the E-mu Proteus MPS at £1,295 or even Midi-fied grand pianos like the Yamaha Disk-Clavier DG2F for £14,699 Other Midi controllers include drum pads like the Roland Octapad that generate Midi notes when hit with a stick; special guitar pickups like the Shadow SH075 at £299; violins and clarinet-like 'breath controllers'. However none of these options have yet achieved the popular acceptance held by the keyboard.

For sampling sound directly into the computer, one relatively cheap option it is also extremely useful to own is a microphone.

PROCESSING

Having generated some input, you need an interface to get it into the Archimedes Midi cards cost around £70 and take the form of expansion podules (Acorn, EMR) or an Econet board (Leading Edge). A Midi card allows your software to receive data from controllers and send edited signals to synths.

Or to go into more detail, the Musical Instrument Digital Interface is an international specification used by musical instruments that contain microprocessors to communicate with other microprocessor controlled devices (other instruments, computers and so on.)

The original Midi standard was formulated in 1982 and, these days, almost all electronic musical instruments are Midi-compatible.

Midi is a serial data link that runs at 31,250 bits per second over five-pin DIN cables. Because Midi cables are unidirectional, each instrument has two ports, called Midi In and Midi Out.

Musical and computational devices are usually 'daisy chained' together so that, when you play a note, instructions are sent from the Midi Out on your input device (controller) to the Midi In on a second device and thence via its Midi Out to the next unit and so on. Modern synthesizers also have secondary outputs called Midi Thru which pass on instructions not specifically addressed to them.

Midi cables carry control information (performance data) to describe things like the channel on which a note is sent (0-15), what pitch it was (0-127), and how hard it was struck (0-127). They also carry information about control events which alter volume, bend notes and create special effects.

Midi has 16 channels and if each instrument is set to a different channel, the system can play up to 16 parts simultaneously.

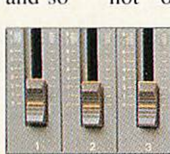
To sample sounds, you need a different type of interface that converts audio signals from a microphone or record into digital data that can be stored and edited on the Archimedes. The cheapest of these built-in samplers is Oak's Recorder at £29.95, an eight-bit unit that is built around a microphone that plugs into the computer's printer port.

Most eight-bit samplers cost between £80 and £200 including software. For instance, Clares produce a mid-range sampler card for £154.95. If money is no object, there's the mighty Armadillo A-616 16-bit system which records CD-quality samples at the professional price of £1,295.

OUTPUT

The simplest forms of music processing need no more than the speaker on your Arc or a printer to produce sheet music. For Midi data, however, you need an external tone generator.

Synthesizers and sample players take the form of keyboards or keyboard-less modules. Synthesizers create synthetic waveforms using analogue or digital oscillators (Oberheim Matrix 1000, Yamaha DX-7) and may emulate real instruments but haven't evolved far enough to do it well. Sample players (E-mu Proteus), however, play high-quality samples of naturally occurring sounds. Many keyboards now use synthetic and realistic tones in combination and are known as synth and sample or 'S+S' units (Korg 01/W, Roland Sound Canvas and so on). Samplers are a step up in processing power from synths and sample players.

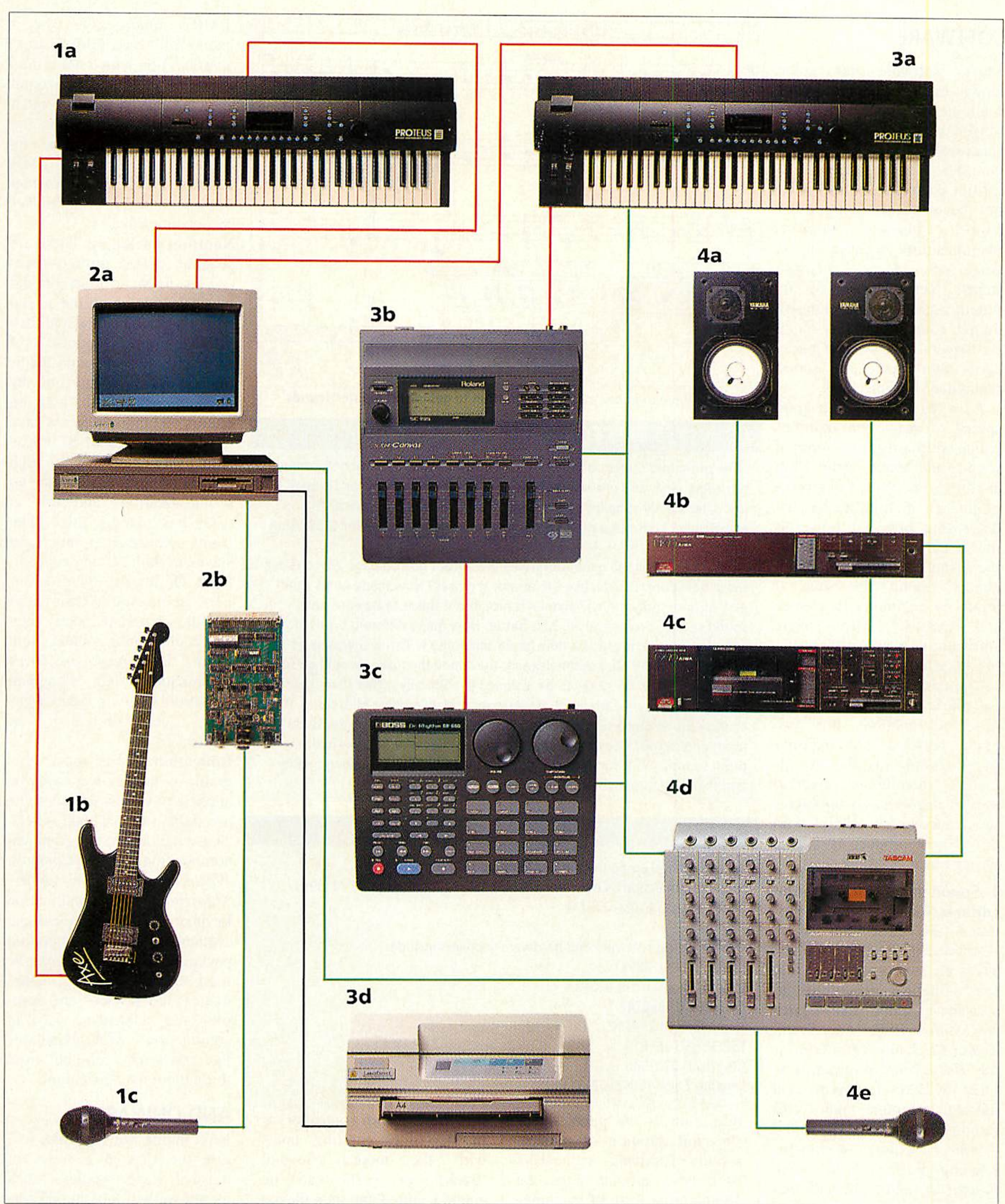


Not content with merely producing sound, they can also record it from a microphone, tape recorder, or often from the digital outputs of a CD or CD-Rom drive. Most do this to 16-bit resolution at a 44.1kHz sampling rate which needs fast processors and 10Mb of Ram for every stereo minute recorded. We're talking serious computers here, right down to the 3.5in disc drive and the SCSI socket. Eight-bit Midi samplers do exist but are of similar quality to on-board units for the Arc so there's not much point. Samplers are not only powerful 'sound generation' tools but also give access to vast, commercially recorded libraries on floppy, CD or CD-Rom. To use these libraries, the sampler should be compatible with the 'industry standard' Akai S1000 (basic model, £1,200). Sixteen-bit sampler prices start with the Cheetah SX-16 at £499 and then go up.

Drum machines are specialised sample players that can write rhythm patterns and combine them into 'songs'. If you are going for computer sequencing, you don't need a DMC, just the drum samples. And many keyboards have drum sounds built in.

If you want a fairly modest Midi setup you can buy a multi-timbral keyboard sythesiser for both input and output. If you are using the Arc's internal sounds or a single synth module, you may need nothing more in terms of sound equipment than a pair of speakers, an amplifier and a tape recorder with microphone sockets.

When using several sound sources, you will need a sound mixer and, if you want to record 'live' sounds as well as electronic sources, you will need a multitrack tape recorder. This is the stuff which recording studios are made of, and the cheapest way to start is with a four-track portastudio.



Musical hardware falls into four categories; columns from left to right: input; processing; digital output and analogue output

DIAGRAM KEY

1a) Keyboard, E-Mu: £1105
1b) Guitar
1c) Microphone
2a) Acorn A4000 plus Midi board
2b) Sampler card from Clares: £154.95

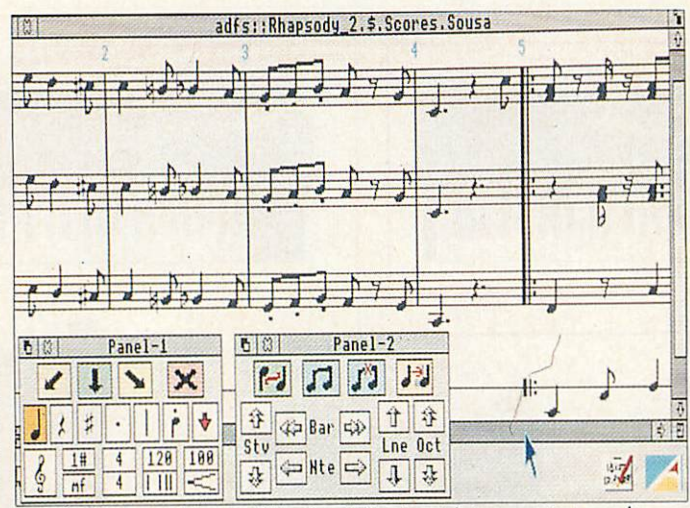
3a) Keyboard, E-Mu: £1105
3b) Module: Roland SC155: £659
3c) Drum machine: Boss Dr Rhythm: £385
3d) Printer
4a) Speakers: Yamaha NF10: £210

4b) Amplifier: photographer's own
4c) Cassette deck: photographer's own
4d) Portastudio, Tafcan 424: £479
Musical hardware by MUSIC CONNECTIONS
Prices correct at time of going to press

COLOUR KEY: Midi data ——— Audio signals ——— Non-Midi data ———

SOFTWARE

Music software has come slowly to many computers for a number of reasons. If it was judged solely on its technical specification the Archimedes would be a major contender as a Midi control machine, yet it has been largely ignored by major music software manufacturers because of its perceived 'niche market' status. Yet because of its inbuilt eight-channel, eight-bit digital sound facilities, many developers have written packages that generate sound without a Midi interface.



You don't have to know traditional notation to get into computer sounds

As a result, there is a good spread of music programmes which primarily use internal sounds and tend to offer Midi as 'an extra'. With the growth of interest in multimedia, the decreasing price of powerful music hardware and an ever-increasing demand for 'CD-quality' sound, this state of affairs is beginning to change and seriously Midi-capable software is now making it's presence felt .

The easiest way to categorise music software is by the different functions the programs perform. The majority of programs on the Archimedes mercilessly overlap these categories, so apologies in advance to any authors who think their product is in the wrong place.

1) Sound generators & sound editors: Sound generation programs are those that create Archimedes internal sounds. There are two types: those that use numerical algorithms to synthesise sound like Clares *VoxSynth*, ESP *FlexiSynth*, *Sound FX Editor* from CIS, or the *HarmSynth* program featured in *BAU* last year, and those that capture and/or edit sample data like EMR *Sound Engineer*, Clares' *Armadeus*, Leading Edge's *Pulse*, Oak *SoundLab* and Armadillo's *HighNote*.

On some computers, there are also synthesizer editors and librarians that remotely alter and store sound generation parameters for specific tone generators using Midi but, so far, none exists on the Arc.

Midi & internal sequencers: sequencers are hardware devices or software programs that can record and store data that controls the pitch, intensity and duration of musical sounds. Hardware sequencers have been around since the 1890s in the form of machines that cut holes into the paper rolls used to drive 'player pianos', but the edit facilities are so limited that only American composer, Conlan Nancarrow, has ever had the patience to compose on one.

These days, most sequencers are programs that emulate multitrack tape recorders and can either 'record' data in real-time from a Midi controller, or in step-time, entering notes with the mouse. Several 'tracks' or parts can be entered, edited and then played simultaneously by internal sounds or from Midi tone generators and, because these programs use 'performance data', you can record difficult parts very slowly and then speed them up to the correct tempo without it all sounding like Pinky and Perky (age-ist reference). Most sequencers either use stave notation (EMR's *Studio 24+*, or a 'piano-roll' type grid (Clares' *Serenade*) on which notes durations are plotted as horizontal lines against a vertical pitch axis. Other variations on the grid idea include drum editors (Clares' *RhythmBed*, EMR *Rhythm Box*, ESP *Rhythm Maker*) and *Desktop Tracker* by Leading Edge.

Notation packages: These are programs whose primary function is to write conventional musical notation on the screen where it can be edited and then printed out. Because of restricted internal sound facilities on STs and all but the most recent Macs, notation editors on other platforms have tended to be specialised 'music word processors' with high quality printout but little or no sound facilities and this is what has distinguished them from sequencers that use staves in their editing environment. On the Arc these definitions are much less clear cut as all the programs that print music also make sounds. Both Clares' *Rhapsody/Score Draw* combination and Longman Logotron's *Notate* could arguably be described as sequencers.

Education: Most music programs on the Arc can easily be applied to education but some are more suitable than others. These include ESP's graphical composition tool, *Compose World* and EMR's *Microstudio*, a combination keyboard tutor and notational sequencer. Sound generation packages and samplers can be used in the study of mathematics and physics and samples and sequences, used in conjunction with databases like *Genesis*, can be used throughout the curriculum.

AND ONWARDS . . .

Next month we will look feature the first in a series of musical case studies. Each month we will look at one person's requirements, suggest a good musical setup, and give them some techniques and tips to get them started.

Our first guinea pig is a young owner of an A3010. He is a fan of 'dance' music so, because this is a very rhythm based type of music, we will be showing him rhythm and drum programming.

TIPS FOR HARDWARE BUYERS

The 'pro-audio'market is very fashion-conscious with new models coming out every year, and one way to save money is to buy 'last year's model' just after steady supplies of the latest groovy instrument have been established. I once bought a keyboard whose RRP was £999 for £350 using this method.

When buying tone generators, (see the output box on page 26) consider these questions: Do you like the sounds it makes? How many notes can it play at once (polyphony)? Sixteen is nice, but if this is to be your only sound source, drums and all, 32 is better. How many different types of sound voices can it use at a time (multi-timbrality)? This is the same as asking how many Midi channels can it use simultaneously. I would go for 16 and would prefer notes to be assigned dynamically rather than have a fixed maximum on each voice. If you want a fairly modest Midi setup, it's economical to buy a single multi-timbral keyboard synthesiser for both input and output. Look for something that sounds nice and has built-in drum sounds. Or, if funds allow, buy one keyboard for its playing quality and then build up modules.

CONTACT LIST

All the musical equipment in our diagram was supplied by:
Music Connnections. Chelmsford (0245) 354777, Chelsea (071) 7315993, Southampton (0703) 233444.

Other musical software and hardware suppliers include:
Clares: (0606) 48511
Oak solutions: (074) 620423
EMR: (0702) 335747
Acorn: (0223) 254254
ESP: (0602) 295019
CIS : (071) 2263340
Leading Edge: (0532) 621111

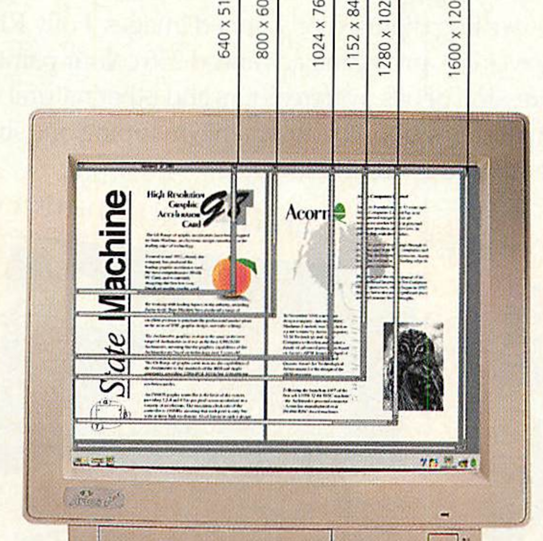
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Performance test on A440/1, ARM2







23 seconds

10.5 seconds



640 x 480 x 256 without G8 card



640 x 480 x 256 with G8 card

Operation time in seconds

0 10 20 30 40 50 60 70 80 90 100

Normal · G8 Accelerated · Sheer · Rotate · Anti-aliased Sprite redraw · Flood fills · Complex redraw · Image enhance

A comparison of speed performance between a standard A440/1 and one fitted with a G8 Accelerator Card from State machine.

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Maximum Resolution (Square Pixels)	1280 x 1024 @ 4 colours
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(Rectangular Pixels)	1600 x 1200 @ 16 colours
	1152 x 848 @ 256 colours
V. Scan Frequency	*56-110Hz (NI), 87Hz (I)
H. Scan Frequency	*31.5-75KHz
Video Memory	512KB
Output Video Signal	Analogue RGB (RS-343A)
	Compsite grey level
	15 and 9 pin connectors
Sync	H. Sync (TTL Level)
	V. Sync (TTL Level)
	Composite (TTL Level)
	Sync on Green
Palette	24 bit (16.7 million colours)

*Mode dependent, (NI) = Non Interlaced, (I) = Interlaced



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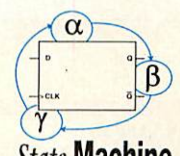
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IN BRIEF

We take a short excursion into the world of drumming, wander round network utilities, consider educational art packages and polish up our Spanish

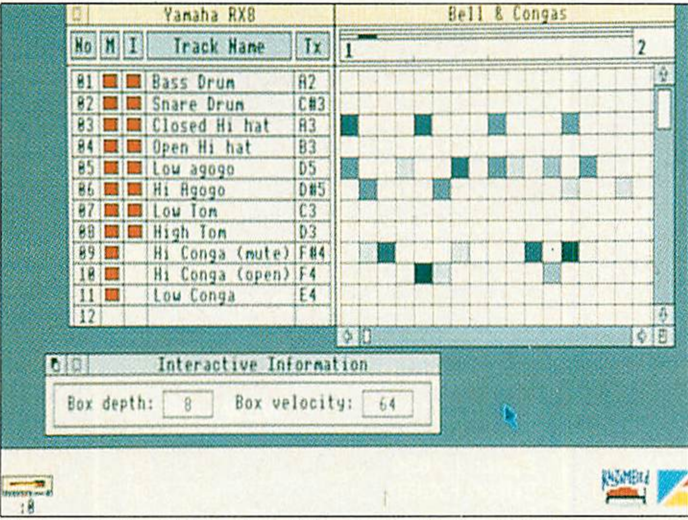
RHYTHM-BED

Clares Micro Supplies
Tel: (0606) 48511
Price: £49.95 inc VAT

There are many advantages to using drum machines: they play in time; they can play the same rhythm for two hours without getting bored; they don't miss rehearsals and they don't get drunk before gigs.

But if you want to approximate the sound of real drumming, creating songs with subtle variations in pattern, tempo and accent, using a DMC to do it can be extremely tedious. This is the main reason for programs called drum sequencers, of which *Rhythm-Bed* is the first full-blown example on the Arc.

At first sight, the display is fairly conventional. Drum patterns are shown as a rectangular grid with a horizontal time axis and a vertical array of 'voices' or instruments. Above this grid, there is a configurable ruler that divides the time line into bars and beats, which are further subdivided into 'boxes'. The ruler also shows 'cue points' where the current pattern starts and finishes.



Rhythm-Bed: the subtlety of a real drummer; and it doesn't drink

To write a pattern, fill in the boxes where you want notes to occur using Select. Standard stuff so far. But *Rhythm-Bed* goes a step further. By continuing to click on Select, the box changes from light to dark grey, and the note volume increases over 16 steps. When you press Play, the pattern cycles between cue points, and lets you make changes.

Rhythm-Bed can record incoming Midi data from a keyboard or a drum machine and sequence up to 255 patterns in any order, irrespective of their positions on the grid.

The implementation is excellent, making extensive use of 'hot keys', and storing drum machine configurations as *Edit* files for ease of modification. Although at its best with a Midi interface, it comes with its own Arc drum sounds.

Rhythm-Bed is very easy to use, and its method for changing dynamics have altered the way I think about electronic percussion. The best drum editor I've seen on any platform.

Richard Garrett

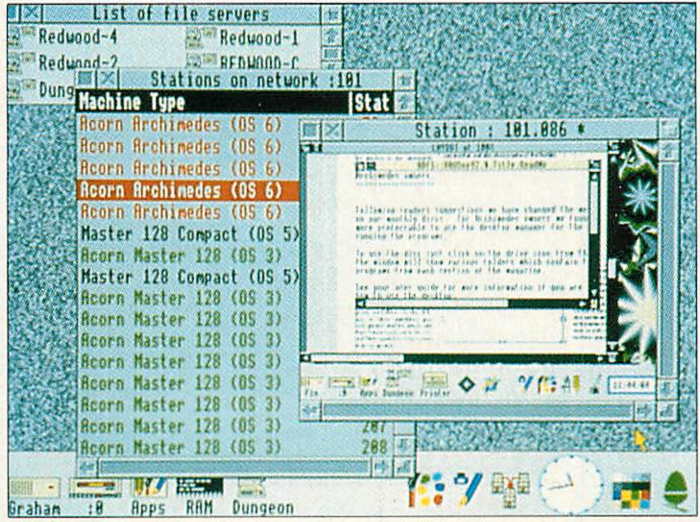
NETVIEW

Sanjay Pattni
Tel: 071-351 6192
Price: £34.99 inc VAT
Educational price: £29.99

Archimedes-based network management utilities have so far been thin on the ground. *Netview* is, in large measure, a Risc OS desktop replacement for the old BBC micro favorites, *STATIONS and *VIEW. It allows you to list all the micros on your network, and to see their screens in a window on yours.

NetView installs on your icon bar only after you type in a password; useful security. A click on the icon brings up a dialogue to specify which machine you want to view, and entering the station number copies the screen.

You can also select a network number and pop up a window showing all the stations active on that net. There isn't, however, any list of network numbers.



NetView is aimed at making the net manager's life easier

Highlighting a station allows you to get limited information like the Econet software and operating system version number, or to send a Notify string to that station; useful now that Notify has been removed from the normal Econet menu. There's even a 'notify all' option.

An obvious drawback is that copying mode 27 screens over even a fairly fast Econet can take a while, perhaps 10 or even 20 seconds on a big bridged network. It would of course be quicker on Ethernet using AUN. A less obvious problem is that you can't view a level 4 fileserver screen; a definite need if you want to run the server 'headless'.

NetView is fully compatible with bridges, both Acorn and new SJ models, so you can view screens of 'very' remote machines. It coped well with the Redwood/*BAU* network of 10 machines on seven sub-nets with six bridges.

The manual warns of possible ways of crashing machines as they are viewed, but in use no problems were encountered. For the limited aims of the package, it works well. There is a lot of scope for development, perhaps with a more graphical network display. The limitations with eight-bit machines do need to be fixed, but that aside, it does offer reasonable value. It should be a boon for teachers and net managers everywhere.

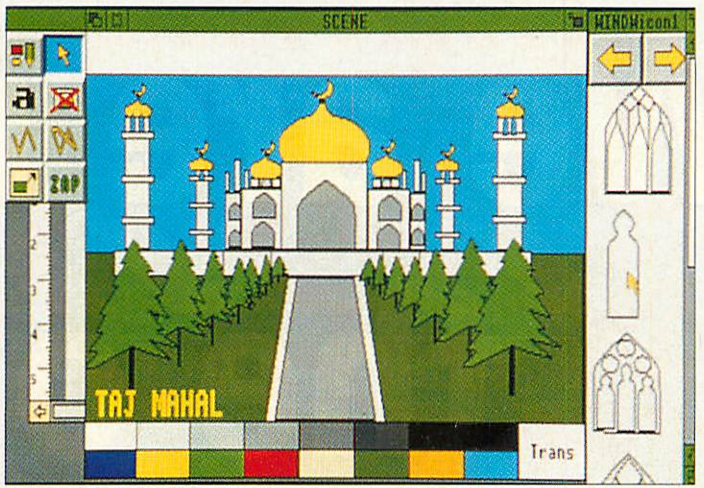
Graham Bell

PICTURE IT

Appian Way Software
Tel: 091-373 1389
Price: £49.00 (inc choice of two topics packs). Separate topic pack available at £15.00

Educational art packages abound for all ages and abilities but there are relatively few object-oriented drawing programs: *Smart*, *Vector* and *ArtWorks* spring immediately to mind. *Picture It* is in this category, and has much in common with *Smart*. It permits young children to build up interesting and complex pictures from libraries of simple *Draw* objects. The bonus is that these libraries are linked to specific topics within the National Curriculum.

The program is fully Risc OS compliant. The work area is flanked by a palette menu, toolbox, and object window. Although initially static, these can be placed elsewhere in order to access all parts of the work area. Object files can be dragged to the object window from library discs to be displayed for selection; up to 15 such files can be viewed.



Picture It lets children develop complex scenes quickly

From here the objects are assembled and manipulated (stretched, shrunk and transformed in other ways), coloured in and 'pinned' in place to produce excellent results. An animation program is included; a computer 'flick-book' which will animate any set of saved images which are numbered sequentially. As it is so easy to make small changes to drawings, quite complex animations can be achieved without any fuss.

The program is open-ended and can share *Draw* files/objects with any other Risc OS-compliant program, which means results can be placed in word processed and DTP documents or further enhanced in such software as 4Mation's *Chameleon*.

Picture It permits children to concentrate on the subject matter without getting bogged down in process of developing a picture. Children can create their masterpieces quickly without monopolising the classroom computer for long periods. The building-block approach of *Picture It* lends itself to group work, with all the ensuing benefits of discussion and decision making. The program also offers an unique focus for a wide range of topic-based activities for Key Stage 2 children.

Children certainly enjoy using this program, because they get pleasing results quickly and relatively easily. The variety of topic packs ensures that *Picture It* has cross-curricular applications and, if there isn't one to suit, you can always create your own by using *Draw*.

Chris Drage

LINKWORD

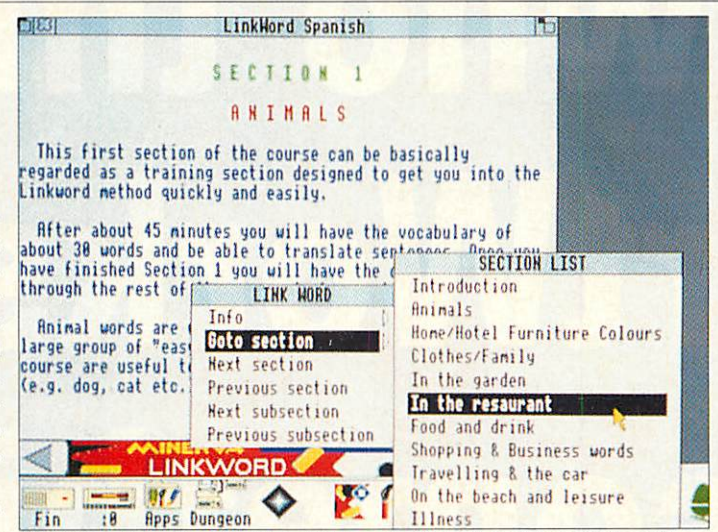
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Tel: (0392) 437756
Price: £39.95

Having just started Spanish evening classes, I was hoping that *Linkword Spanish* would allow me to skip all those tiresome vocab lists and that tedious verb conjugation and go straight to reading Gabriel Garcia Marquez in the original, or at least enable me to order tapas without recourse to a dictionary.

When it comes down to learning a language, there is sadly no substitute for hard work, but this package does offer a welcome helping hand.

Linkword Spanish is based on a concept developed by its author, Michael Gruneberg. The idea is that students remember the sound of a word by creating a mental picture of it. It applies to any language, and Minerva is now releasing German and French versions.

The Spanish word for beach is *playa*, so to help you fix the word in your head, the program suggests you imagine pairs of pliers scattered all over a beach. Picnic is *merienda*, so you are asked to think about 'your picnic coming to a merry end, possibly because people have drunk too much'. If a word sounds similar in English and Spanish, your scenario always involves a bullfighter, so to remember the word for tomato, which is *tomate*, you picture a bullfighter being pelted with tomatoes.



All right, so it can't spell café; but Linkword will do its best for your Spanish

It all sounds silly but, partly because the images are generally rather ridiculous, they do tend to stick in your mind and I have had some success with the method.

The sections cover all the usual categories of vocabulary, such as animals, food and drink, shopping and travelling.

The words and their Spanish equivalents appear one by one, along with the suggested memory-joggers. This is followed by straightforward tests – English to Spanish and Spanish to English – and then the user is asked to translate a series of easy sentences.

Responses are input on the keyboard and come up on screen so you can compare them with the correct answer. Very simple grammar is taught in each section, and the computer work is supported by an audio tape.

There's just one menu; this allows you to move around the program and the only 'feature' is a neat little clock symbol that, when you click on it, means the computer waits 10 seconds before it brings up the next screen. This helps you concentrate on each word for the recommended time.

Linkword Spanish is extremely simple to install and use. But that simplicity is why the package disappoints slightly, as I can't help feeling that the machine's power could have been used more imaginatively. For instance, what about some *Catchword*-style graphics to illustrate the *aides-memoire*?

This might well prove valuable for getting students started. It would also offer holiday-makers or business people a basic familiarity with the language. As for me, I'll keep taking the evening classes; but I'm still hoping that someone, somewhere, will develop a program which will give me instant fluency with no effort whatsoever.

Lisa Hughes

We are not the only ones who think ArtWorks is something special.



NEW FRONTIER

Claire Johnson follows the historical trails offered by Frontier 2000, the latest in multimedia classroom software

When the postman arrived with my *Frontier 2000* parcel he complained that it was far too heavy: as with the disc-only version, this CD-Rom arrived packaged in a smart yellow folder containing tapes, postcards, guide books, information books, a video welcoming you to Carlisle and even a piece of Roman timber. The pack also contained the floppy disc version of the software and two small instruction manuals.

The first advantage of this CD-Rom was the discovery that all the operating software was on the disc, so pointing at the icon and clicking gave a window that immediately allowed a double click on the application icon; you set off on either a trail or an exploration.

Frontier 2000 is essentially a multimedia, historical guide to Carlisle. By exploring a map of the area the user can delves into all sorts of historical details, in the form of text, pictures, speech and even short movies. I started by following a trail of clues through one of the preset topics, getting my information to solve these clues from the various experts on call. Each trail follows specific topics such as the local cathedral, railways, Bonnie Prince Charlie and the Civil War.

In each case the academic gives information relevant to the trail and a clue to the next destination. These are then reached by simulated car travel; and a video clip appears showing the car. I found that time-consuming and soon turned it off, but the pupils loved it and insisted on keeping it. There is a timing element built in to the trails, and travelling is taken into account, so the pupils are penalised for wasting time

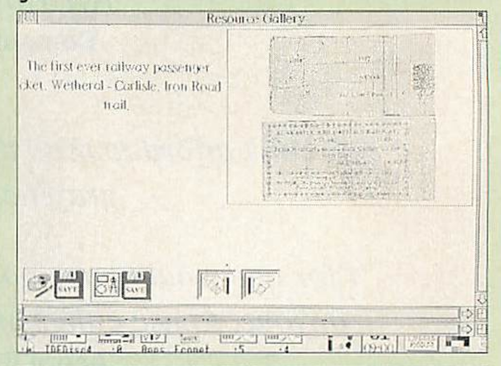
THE TRANSPORT TRAIL

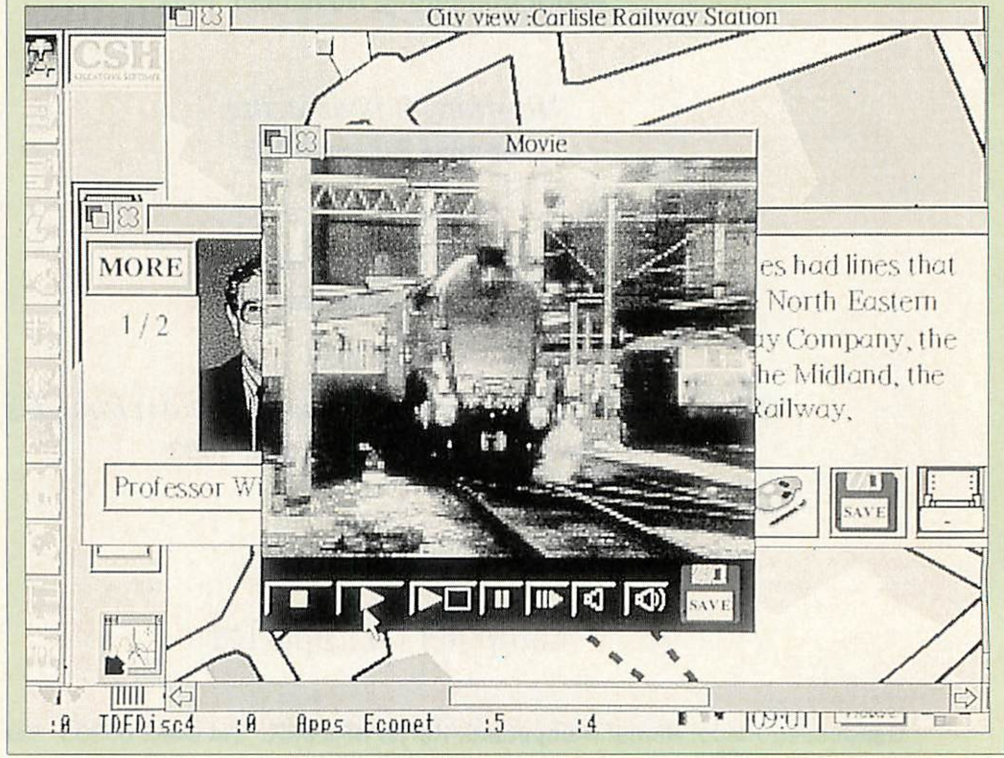
History supplementary study units at Key Stage 2 include Ships and Seafarers and Land transport. Core study unit 4 at Key Stage 3 is Expansion, trade and industry. There are two trails included on the disc; one dealing with the growth of railways and the other dealing with general transport. Study of the railways trail leads us into a very pertinent topic, that of the variety of companies providing rail transport in the early years; seven coming and going from Carlisle.

The trail goes on to look at the building of the railways; it takes us to a station and we can compare journey times then and now by reading timetables. There are also pictures here of the very first rail ticket which was produced by the stationmaster at Brampton. The Solway Viaduct was built to carry the railway; it no longer stands but held a record and was an incredible feat of engineering. To find its location on the map we have to use grid references.

This region was also the scene of a major train disaster; and the numbers of casualties were not published at the time. The reason for this is part of the pupils' historical investigation and could lead to some very interesting work on the validity of historical evidence. The transport trail leads us into sea trade and smugglers and a look at the defunct ship building industry. The trail leads us to graveyards and the grave of a warship captain; allowing a trip into naval battles, pirates, sea trade and forced conscription.

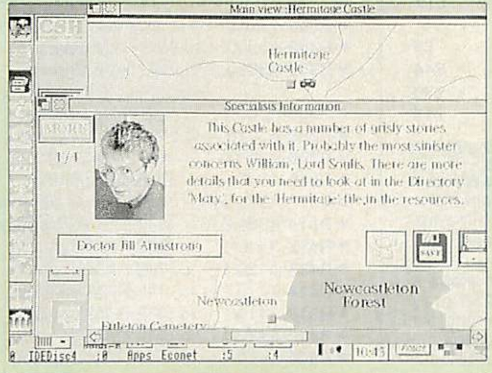
We also take a brief look at the canal and the reasons why trade grew up by canals and flourished until the advent of the railways. Finally we are lead to modern forms of transport, the airport at Carlisle and the M6; now a heavily congested link with Scotland. All these forms of transport provide very important clues to the growth of trade and industry and urban development. There are video sequences of a steam train pulling into Carlisle station; much more fun than the common diesel engine known to the school generation.

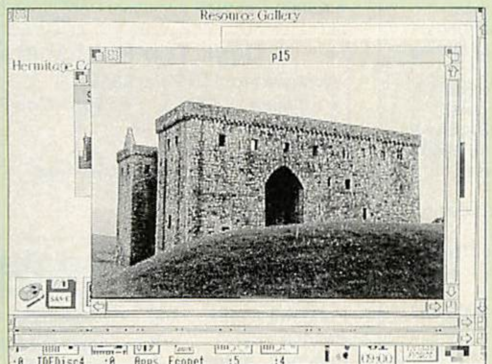




THE QUEEN OF SCOTS

At Key Stage 2 of the History National Curriculum document, pupils are required to study Tudor and Stuart times, including the key elements of politics, religion, social, economic and cultural perspective. They are to study the causes, consequences and connections between pieces of historical evidence and develop an awareness of the different ways in which past events are represented. They should also be given plenty of opportunities to 'ask questions, choose sources for an investigation, collect and record information . . . select and organise historical information . . . present results'.





One of the trails provided on the disc concerns the period that Mary, Queen of Scots, spent in the Carlisle area, both as a prisoner of Elizabeth I and beforehand. The Frontier trail provided leads us to investigate her three marriages and their consequences; she visited Bothwell at Hermitage castle before the death of Darnley. Her first marriage was at the age of 15 to the French Dauphin, and this leads us into French history and the important links between France and Scotland, which starts to offer some clues as to why Mary, Queen of Scots, posed such a strong threat to Elizabeth of England.

The trail leads us on to Carlisle castle; this was one of Mary's many prisons and we are questioned about her relationship with Elizabeth. The relationship between the two queens greatly affected the future of the English monarchy. Why and in what way? We are told in some authentic language that Mary watched a game of football in the castle grounds. In the16th Century? When was it invented? What other sports did the people of Tudor times play? What were Mary's prison conditions like? We are then lead on to the plot against Elizabeth that was uncovered by the English secret service, led by Walsingham, that meant execution for some, imprisonment for others, and eventually death for Mary, Queen of Scots.

There were other supposed plots against the English throne, and Mary is still considered by some historians to have been a much-maligned figure in Tudor history. There are pictures of both Hermitage castle Carlisle castle included on the disc and the pack contains a book about Mary that includes family trees, portraits and other historical evidence and documentation.

The resources file on the disc contains some wonderful stories about Hermitage castle and a contemporary account of the enigmatic football match. This Frontier disc makes a good starting point for any historical investigation of Tudor and Stuart England.

travelling to incorrect locations; but this didn't always seem to deter them. At each location a question is asked and the experts provide information although in some cases this is trivial, and leaves you wanting more.

Some of the locations have pictures attached to them, and these take the form of photographs – both old and new – of sites, pictures of historical artefacts and paintings. All of these can be accessed from a list, saved as sprites or *Draw* files and can also be used in other ways by pupils.

They are all of an extremely high quality and provide some very useful and interesting historical resource material. There are also several replay clips of video, including a steam train and a news broadcast. The time line is also provided, containing some 25,000 words. It starts in 43 AD, finishes in May 1991, and can be searched by date, word and category.

The disc also contains a number of other resources, including some *Maestro* files of historical ballads and a folder containing documents relating to an elderly resident of Carlisle that could give rise to work based on more recent history available to pupils through older relatives. There are also a number of worksheets provided that allow pupils to record things systematically as they go through the wealth of information available on the disc.

The software is very easy to use and the well-written manual is rarely needed. At all times it is possible to save, print or backtrack easily through the historical documentation. I really did feel, by the time I had explored Hadrian's wall with the Romans; Bonnie Prince Charlie and the Civil War with the Roundheads; gone round the cathedral with the guide; and visited the museum, that I had been there and seen it all.

PRODUCT DETAILS

Product: Frontier 2000
Supplier: Cambridgeshire Software, 7 Free Church Passage, St Ives, Cambs PE17 4AY
Tel: (0480) 67945
Price: £95

Watford Electronics Ltd

Established 1972



The sign of Quality

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System	Basic	Colour	Multiscan
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A3020-2Mb FD	–	£749	£799
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A4 Notebook with 2Mb RAM	£1399
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FREE OFFER

When you purchase any of the above Archimedes Micros, we will give 10% of the value of the machine in Hardware or Software of your choice

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Risc OS 3 Upgrades

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- Software Upgrade Kit for the rest £40
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- Technical Manual £39
- Serial Upgrade £19
- A3000 Dust Cover £5
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- A3000 User Port/Midi Upgrade Card £44
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- A3000 External Podule Case £15

Graphics Accelerator Cards

The ultimate G8 range of Graphics Accelerator Cards from State Machine, for the Archimedes micro give more resolution, colours and speed.
Features:

- Fully programmable 24 bit colour palette allows a choice of 16.7 million colours. True 256 grey scale, primary and VGA palettes supplied for enhanced dithering with RISC OS applications.
- DTP now easier with fully legible one or two A4 page screen display in 2, 4, 16 or 256 colours.
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- 4 layer single width podule – no soldering required
- Full documentation and operating software supplied.
- Requires RISC OS 3.10.

P.S. Not compatible with A3010, A3020, A4000 and A4.

G8 Pro additional features:

- Desktop compatible 768 x 576 CCIR PAL interlace in 256 colours
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Supplied with 3.5" Floppy Disc Drive and a mouse, Colour Monitor and lead, TV modulator, 20Mb fast IDE Hard Disk Drive, 'Compression' utility to increase the Hard Drive capacity to typically 40Mb, the highly acclaimed Computer Concept's Impression Junior DTP package, EasiWord wordprocessor, Quest for Gold game, applications suite of software packages and comprehensive audio training tape.

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Above Package plus Acorn's Learning Curve **£874**
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Special Education discounts available on micros, RAM upgrades, ARM 3 Turbo Card, etc. Please write in or telephone:

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All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

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Computer Concept's professional Art package ArtWorks £139



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Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.

Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.

A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.

By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
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- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	£195
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ADA 0570	200Mb	15mS	£449
ADA 0580	330Mb	15mS	£799

All the above 3.5" hard drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000 **£85**
Archi IDE Hard Disc Podule only **£89**

Internal Hard Disc Drives for A3000

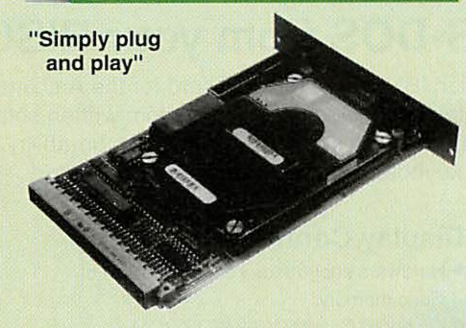
State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

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ADA 0750	60MB	18MS	£329
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Supplied ready assembled. No soldering required. Simply plug into the allotted space.

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Watford's easy to instal, low cost, high performance, revolutionary IDE Hard Cards for the A300 & A400 series Archimedes.

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(Can be used as a Removable Hard Drive)

NEW Archimedes A300/A400 SCSI Hard Disc Offer
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100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £799

Offer Price: £325

Also available with 16-bit controller **£359**

Leasing facility now available. Please telephone or write in for details.

Low Finance now available on Archimedes. Please telephone for details.

Archi to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version also available (please specify)

- For A3000 £15 • For A5000 £16

For A3000 Serial Upgrade **(£19)** required

A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

Minerva's Archimedes Software

EasyWord	£18	Time Tabler	£549
Home Accounts	£35	System Delta	£59
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Stand alone Business Accounts Packages
Sales; Purchase; Order Processing and Invoicing; Nominal; Stock management
£79 per module
or Complete Business Package **£325**

ARM 3 Turbo Card MkII

Simply The Best



Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £169. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.

Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £24.

(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Special Offer £145

Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

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MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£375**

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Watford Electronics Aries PC Card

Access the world of MS-DOS from your RISC OS based computer

Watford Electronics brings you a full specification IBM compatible PC card for the Archimedes. You no longer require the Archimedes PC Emulator, all PC software is run locally on the expansion card with custom written software to interface the PC card into the RISC OS environment. The expansion card is a full hardware implementation, with the ability to be turned into an ISA Bus, fully fledged 386 PC just by the addition of a power supply, keyboard, storage device and a monitor!

Processor

386SXL 33MHz low power processor. Socket for optional 387SX 33MHz numeric co-processor.

On Board Peripherals

- Uses 82C107 single chip solution.
- 128 bytes of battery backed CMOS RAM.
- AT compatible Keyboard Controller.
- Uses standard Archimedes keyboard and mouse. Full standard ISA 16 bit expansion bus available.
- Optional expander allows one or two half size PC cards to be installed in the adjacent Archimedes expansion slots.

Memory

- Uses 82C311 memory controller 2Mb zero wait state DRAM as standard, upgradable to 4Mb DRAM just by adding 4 more chips.
- Bank interleaving and page mode memory operation for maximum performance.
- On-board BIOS ROM.

Display Controller

- Hardware support for VGA with 512Kb of video memory.
- On board Quadtel VGA BIOS ROM.
- Multitasking screen display on RISC OS.
- Desktop can be achieved in software.
- Separate VGA monitor can be connected for simultaneous RISC OS and PC display or your Archimedes VGA compatible monitor can be used with optional video switch.
- Much faster and improved video speed compared to PC Emulator.

Hard & Floppy Disc

- Full background disk access, the Archimedes is not adversely affected.
- Any existing Acorn PC Emulator hard disk partition can be used, with the ability to create new PC hard disk partitions on any RISC OS hard disk.
- Optional IDE hard disk and floppy drive option for direct connection of a dedicated hard disk and floppy to PC card.
- Access to the Archimedes floppy disc drive for reading and writing of PC disc formats from PC.

Bundled Software

- MS DOS 5.0, Lotus Works and PC Organiser

Sound

- Uses the Archimedes internal speaker by connecting to the Auxiliary sound connector.

Enhancements

Optional expansion card will be available either hardware parallel and serial ports or the ability to connect an external AT style keyboard and mouse.

The PC card can also be plugged into a stand alone backplane to form the heart of a fully expandable, industry compatible 386SX computer, with no reliance upon the Archimedes.

Specifications may be subject to change. E&OE.

Call, fax or write now for more details!

Scan256 – The only sensible scanner purchase

Scan256 – the innovative 256 grey-level hand scanner for the Archimedes range of micro computers. It offers up to 256 grey levels at a maximum of 400 dpi, and comes complete with the most advanced and sophisticated 256 grey scale scanner software currently available for the Archimedes.

- Multiple copies of the image in memory at once.
- Allows multiple consecutive operations without having to save the original image to disk.
- Instant re-draw of all 4 image buffers.
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- A unique L.E.D. indicator on the scanner.
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- Fully adjustable scale and size of image preview when scanning
- Hand held scanner image preview window can even be behind other windows and preview is shown in real-time with maximum number of grey-scales available.
- Support for The Serial Port Graphics Enhancer.
- Forthcoming support for the State Machine G8 Graphics Card.
- Allows up to 256 simultaneous grey scales on screen at once.
- True brightness, contrast and gamma correction.
- All can be specified by a value to exactly match monitor/printer. No guessing with shapes of curves and correction is mathematically correct.
- RISC OS 3 features.
- Include rotation and shearing. Scans normally are scanned at a slant rather than being rotated, shearing enables the scan to be corrected better than rotation.
- Fast RISC OS printing.
- Multiple options such as scale to page, centre, sideways selected area, and any scale.
- Scanner scans at an amazing 3ms per line.
- A post card at 400dpi takes only 7.3 seconds to scan, creating over 3Mb of data.
- Selectable scanning modes.
- 256 grey-scale, 256 grey-scale half width, 16 grey-scale and monochrome scanning modes. Half width mode enables longer 256 grey-scale scans to be achieved.
- Save image foreign formats.
- Save as industry standard TIFF for exporting to other systems, AIM for further processing, or RISC OS Sprite format.
- Single width, high quality podule using surface mount technology

The only sensible scanning and image processing solution for the Acorn Archimedes. Just compare the features, there can only be one choice...

Scan256 Scanner, Interface Card, Software and Manual Only £185

Please specify Archimedes type.
Not compatible with A3010, A3020, A4000

Call now for details about our new Scan256 Flatbed Professional Scanner

BBC Education Software

Title	Description	Price
A vous la France	French programs for beginners	£29
Au restaurant/Accident de route	French games for 12 years +	£26
Bolougne and oh les	French program for beginners	£26
Computer control	Program simulating computer control	£26
Computers at work	Primary education program	£17
Espana Viva	Spanish educational programs	£20
Folks Tales	Listening and reading for ages 7+	£22
Geordie Racer	Look and read for ages 7+	£22
Hall of Mirrors	Practice word & number skills	£22
Help your child learn basic mapwork 2		£18
Inside Science	Four common science subjects	£22
Letters and pictures	Educational programs for 6-8 years	£15
Make a wildlife garden	Explore wildlife/weather/garden growth	£22
Maths with a story 1	Primary level maths programs	£20
Maths with a story 2	4 further maths programs	£20
Note invaders	Learn sheet music for 7-Adults	£15
Numbers & Pictures	Early number learning (4-6 years)	£15
Picture craft	Geometrical design & Colouring	£17
Puncman 1 & 2	Learning Punctuation (7-13 years)	£15
Puncman 3 & 4	Learning Punctuation (8-14 years)	£15
Puncman 5, 6 & 7	Learning Punctuation (8-15 years)	£15
Ramayana Tales	Simple Desktop Publisher using pictures & characters from the Ramayana	£22
Skyhunter	Look and read educational adventure	£22
Technology and design	Problem solving programs	£22
Through the dragons eye	Adventure game and Map reading	£22
Fun School 3 (Under 5)	Varied range of Education subjects	£17
Fun School 3 (5-7)	Varied range of Education subjects	£17
Fun School 3 (Over 7)	Varied range of Education subjects	£17

Archi Educational Software

- Animated Alphabet (3-6 yrs) £21
- Arcventure (8-12 yrs) £29
- Bookbinder £43
- Bumper Disc £14
- Bumper Disc 2 £14
- Craftshop 1 £26
- Craftshop 2 £26
- Converta-Key £16
- Data Word £16
- Desktop Stories £35
- DigiSim £35
- Dream Time (5-7 yrs) £23
- Farm (5-7 yrs) £19
- Fleet Street Phantom (9-13 yrs) £25
- Fun School 3 Red (up to 6 years) £17
- Fun School 3 Green (6-8 years) £17
- Fun School 3 Blue (8 years +) £17
- Gate Array Teaching System £68
- Glimpse Clip Art Utility (7-16 yrs) £8
- Highlighter (6-16 yrs) £42
- Jigsaw £28
- Mapventure (9-13 yrs) £24
- Microbugs £24
- Money Matters £16
- Nature Park Adventure (7-9 yrs) £27
- Numerator £60
- Picture Book £16
- Recall (6-13 yrs) £39
- Sellardore Tales £24
- Snippet £26
- Space Mission Mada (9-13 yrs) –
- Sting of the Dump (9-13 yrs) £22
- Target Maths £16
- Viewpoints (9-12 yrs) £33
- Wizard's Revenge (7-10 yrs) £17
- Worst Witch (7-10 yrs) £25

Archimedes Software

GRAPHICS

Title	Price
3D Construction Kit	£39
Arc Light	£46
ARCtist	£19
ARCticulate	£19
Art Works	£139
Atelier	£65
Artisan II	£45
Artisan Gallery	£16
Autosketch II	£65
CADet (CAD)	£140
Craftshop 1 & 2	£28
Euclid 2	£50
Graph Box	£59
Graphbox Professional	£107
HotLink Presenter	£40
Illusionist	£69
Kermit	£46
Mogul	£17
Poster	£79
Pro Artisan	£70
Prime Art	£69
Render Bender 2	£79
Revelation 2	£80
Snippet	£21
Titler	£119
Tween	£29

GAMES

Title	Price
Air Supremacy	£17
Apocalypse	£14
Black Angel	£27
Boogie Buggy	£14
Break 147 + Supa Pool	£19
Bughunter in Space	£19
Cataclysm	£19
Chess 3D	£16
Chocks Away	
Compendium	£32
Chocks Away Extra	£14
Chuck Rock	£–
Conqueror	£15
Corruption	£18
Cyber Chess	£38
Ego Repton 4	£–
Elite	£33
Enter the Realm	£19
E-Type Compendium	£20
E-Type Designer	£13
Family Favourites	£13
Galactic Dan	£19
Gods	£–
Grievous Bodily Arm	£19
Holed Out Designer	£13
Holed Out Golf Comp	£20
Hostages	£14
Inter Dictor 2	£26
Iron Lord	£15
Jahangir Khan Squash	£–
Jigsaw	£27
Lemmings	£20
Oh no more Lemmings	£15
Lost Temple	POA
Lotus Turbo Challenge	£19
Mad Prof Mariarti	£17
Masterbreak	£16
Man at Arms	£14
MahJong Patience	£15
Manchester United II	£19
Mig 29	£24
Nebullus	£21
Nevryon II	£20
Omar Sharif's Bridge	£23
Pandoras Box	£18
Pipe Mania	£17
Play It Again Sam	£–
Populous	£23
Puncman 1 & 2	£16
Puncman 3 & 4	£16
Pysanki	£14
Quazer	£10
Real McCoy 2	£23
Real McCoy 3	£22
Redshift	£14
Return to Doom	£16
Repton 3	£14
Saloon Cars Deluxe	£27
Spitfire Fury	£22
Splice	£25
Sporting Triangles	£24
Superior Golf	£14
Superpool + Break 147	£22
Swiv	£19
Talisman	£12
Timewatch	£24
Trivial Pursuit	£22
Twin World	£15
U.I.M.	£23
White Magic 2	£15
Worldscape	£16
XFire	£19
Zelanites	£23

Miscellaneous

Title	Price
Ancestry	£59
Arccomm 2	£38
Arcterm 7	£64
Armadeus Sound	£60
Avante Garde Fonts	£23
BBC DFS Reader	£6
Broadcaster Loader	£65
Compression (CC)	£38
Equasor	£38
FlexiFile	£97
Genesis Plus	£68
Genesis 2	£99
Investigator 2	£22
Magpie 2	£42
Notate	£42
Numerator	£66
Pin Point	£65
Presenter 2	£29
Presenter Story	£145
Prophet	£132
Prophet Demo Disc	£10
Rainforest	£17
Revelation 2	£95
Rhapsody in Blue 2	£45
Score Draw	£46
Show Page	£127
Speech!	£15
The Victorian	£17
Time Tabler	£549
Toolkit (Clares)	£35
Touchtype	£40
Tracker	£39
Turbo Driver BJ10E	£42
Vox Box	£46
WorldScape	£17

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77 — £77 each
Assembler; LISP; Prolog X — £149 each

Title	Price
Desktop C	£199
Macro Assembler	£40
Robo Logo	£69
BASIC Compiler	£77
Logotron Logo	£45
Risc Basic	£120
Risc FORTH	£110
Cambridge Pascal	£95

Archimedes External Disc Drive Interface

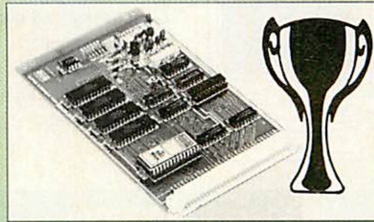
With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.

Price £21

Back Plate Extension

- A300/400 £15;
- A3000 £14

Archi Real-Time Digitiser



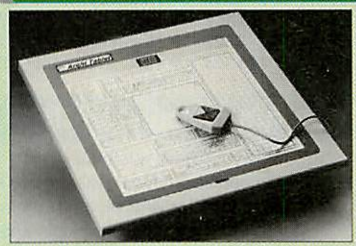
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £119

A Set of Colour Filters for colour image grabbing using a video camera £16

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)

Stylus Optional Extra **£20**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£125**

Concept Keyboards

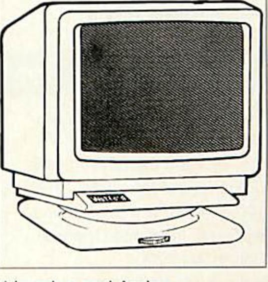
- A4 Standard Pack £95
- A4 Primary Pack £100
- A4 Designer Pack £110
- A3 Standard Pack £99
- A3 Primary Pack £105
- A3 Designer Pack £110

- Universal 2010 Keyboard A3 £115
- Universal 2010 Keyboard A4 £110

Cortian CKAI Interface

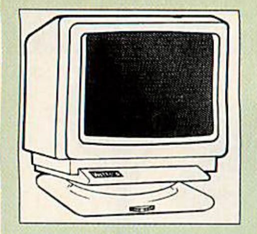
Eliminates the need to have a User port in A3000, A5000 and any other Archimedes without User Port. Fits to the Econet socket. £29

STAR BUY MONITOR



This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video input. All controls are located on the front panel for ease of use. Ideal for BBC, Archimedes and Amiga.

Only £149



FREE
Connecting lead with every monitor purchased from us. Please specify type required.

Microvitec Monitors

- **1431** – Standard Resolution Monitor #£169
- **1451** – Medium Resolution Monitor #£209
- **Cub3000** Medium Res for A3000 #£189
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239
- **Touchtec 3000** £–

Includes 3 years parts & labour warranty

Multiscan Colour

• Eizo F550i	£726	• Taxan 787	£225
• Eizo T560iT	£1319	• Taxan 787LR	£245
• Eizo T660i-T 20"	£1615	• Taxan 795PC	£415
• NEC 3FG	£345	• Taxan 875	£715
• NEC 4FG	£442	• Taxan 875+	£745
• NEC 5FG	£827	• Taxan 970	£1195
• NEC 6FG	£1485	• VIDC Enhancer	£25

Aries AlphaScan Monitor

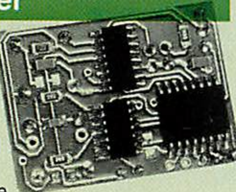
Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The VIDC Adaptor supplied with the monitor allows high resolution operation in all screen modes. **£325**

- Aries Alphascan 17" Plus £545

Philips Monitors

- **BM7502** 12" Hi-res Green Monitor £82
- **CM8833** 14" Med. Res Colour Monitor £185
- Dust Cover for Philips Monitors £6
- Spare Monitor Leads (various) £7

VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A Desk Top application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: Its unique design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

Integrex Ink Jet Printers

- Colour Jet 132 Printer £425
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £21 • Black Cartridge £12.40
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123
- Colour Jet 2000 £529
- Betajet Ink Jet Printer £185
- Betajet Cut Sheet Feeder £43
- Integrex Colourjet Series 2 £POA

Star Printers

LC15	£168	LC200 Colour	£140
LC20	£99	SJ48 Inkjet	£160
LC100 Colour	£136	XB24-200 Colour	*£288
LC24-15	£233	XB24-250 Colour	*£350
LC24-20	£148	XB24 Colour kit	£29
LC24-100	£162	ZA200 Colour	*£230
LC24-200	£162	ZA250	*£295
LC24-200 Colour	£205		

- Star/Archimedes Colour Printer Driver £15

* Includes 12 months On-site warranty

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
XB24-200	£99	XB24-250	£149

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £52

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55
32K Ram Cartridge for LC24 £54

Star Printer Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

- Dust Covers for Star Printers £6

NEC Pinwriter Printers

• P20#	£169	• P70	£396
• P30	£235	• P90	£603
• P60	£322		

- P60/70 Colour Option Kit £59
- Ribbons Black for P20/30 £6 for P60/70/90 £7
- Ribbons for P60/70/90 Black £9 Colour £13.50

Includes 12 months on-site warranty

Cut Sheet Feeders

P20 £59; P30 £85; P60 £89; P70/90 £80

Panasonic Printers

KX-P1123	£126	KX-P2123M	£165
KX-P1170	£98	KX-P2123C	£195
KX-P1624	£250	KX-P2180M	£127
KX-P1654	*£330	KX-P2180C	£145
KX-P1695	£267	Colour Kit for KX	
KX-P2124	£POA	P2123M/2180M	£38
KX-P2624	*£268		

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i £79 **P37** – 1123/70/80 £69
P38 – P1624/95; P2624 £129

Buffers

P12 4K Buffer Board for KX-P1081 £55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95 £16

Serial Interfaces

P13 for all above printers £49

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 £6
P115 for KX-P1180 £7 **P145** for KX-P1124 £7
P140 for KX-P1540 £8 **P155** for P1624/2624 £8
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red £9 each
P150C Colour for P2123/2180 £15

Citizen Printers

• 120D+	£98	• Swift 200	£178
• Swift 9	£145	• Swift 240	£200
• Swift 9X	£190	• Swift 240C	£212
• PN-48	£199	• Swift 24X	£295

- AH29804 Manual Cut Sheet Feeder for Swift 9/24/124. Holds 50 Sheets £29

+ FREE 2 years Parts and Labour warranty on all Citizen Printers

- Swift 9 Colour Option £19
- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13
- Swift 24X Ribbons Black £8 Colour £16
- Citizen/Archimedes Colour Printer Driver £15

Laser Printers

All Laser Printers include 12 months On-site maintenance

Brother HL4-VE	4ppm	£549
Brother HL4-PS Postscript	4ppm	£970
Brother HL8-V	8ppm	£894
Brother HL-10V	10ppm	£1059
Brother HL10PS	10ppm	£1329
Brother HL10DV	10ppm	£1149
Brother HL10DPS	10ppm	£1449
Canon LBP4 LITE	4ppm	£479
Canon LBP4+ 1.5M RAM	4ppm	£632
Canon LBP-8III Plus	8ppm	£945
Canon LBP-8 plus IIIR	8ppm	£1435
Epson EPL4300	6ppm	£566
Epson EPL4000	6ppm	£475
Epson EPL7500	6ppm	£1139
Epson EPL8100	10ppm	£920
Fujitsu VM800 (Best Buy)	8ppm	£685
HP Laserjet IIP+	4ppm	£530
HP Laserjet IIID	8ppm	£1487
HP Laserjet IIIP	4ppm	£595
HP Laserjet IIISi PS	16ppm	£2419
HP Laserjet IV (600 dpi)	8ppm	£989
HP Laserjet 4M PS	8ppm	£1369
NEC Silentwriter S62P P/script	6ppm	£1019
NEC Silentwriter 266	8ppm	£669
NEC Silentwriter 290P P/script	8ppm	£1369
NEC Silentwriter S102	8ppm	£989
OKI OL400	4ppm	£440
Panasonic KX-P4410	5ppm*	£465
Panasonic KX-P4420	8ppm*	£615
Panasonic KX-P4430 Satin Print*	5ppm*	£586
Panasonic KX-P4451	11ppm*	£993
Panasonic KX-P4455 Postscript	11ppm*	£1249
Star LP-8 III 2	8ppm	£1249
Star LP-8 III	8ppm	£890
Star LP-8 Star(post)script	8ppm	£1130
Star LP-4	4ppm	£565
Star LP-4 Mk 3	4ppm	£589
Star LP-4PS Postscript	4ppm	£769

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£46	Star LP4/LP8	£56
Epson GQ	£13	KX-P4420/30	£24
EPL 4100	£69	Laserjet HP IIP & IIIP	£42
EPL7100/7500/ 8100	£125	Laserjet II/D, III/D	£48
HP 4	£75	Qume Crystal (3)	£58

Laser RAM Upgrades

IIP; III/P 1Mb	£49	Canon LBP8 2M	£125
IIP; III/P 2Mb	£80	EPL7100 256K	£39
IIP; III/P 4Mb	£132	GQ5000 512K	£42
II & IID 1Mb	£60	KX4420/50i 1M	£75
II & IID 2Mb	£96	KX4420/50i 2M	£115
II & IID 4Mb	£142	KX4420/50i 4M	£195
HP4 1Mb	£65	Star LP8 1M	£139
Canon LBP4 1M	£105	Star LP8 2M	£275

Laser Drum & Developer

• Epson Drum GQ5000	£93	EPL7100	£129
• Panasonic 4420 Drum	£60	Developer	£59
• Panasonic 4450 Drum	£93	Developer	£80
• Qume Drum	£76		

Jetpage Postscript Cartridge

- HP IIP/III £225 IID & IIID £227

Various Add-Ons

- HP Adobe Postscript + Cartridge £359
- HP Premier Font Collection £28
- Laserjet various Font cartridges from £45
- Canon LBP-4 Lower Cassette Tray £75
- Pacific Page Postscript £259

Laser Direct

- Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers £315
- LPB 4 Printer plus High Res Card £945
- LPB 8III Printer plus High Res Card £1275
- LPB 4 Optional Paper Tray £79

Hewlett-Packard Printers

DeskJet 500	#£255	DJ500 colour	#£325
DJ550 colour	#£415	Paint Jet	+£495
Paint Jet XL	+£1045	PaintJet XL300	+£1775
QuietJet	+£293	PJet XL300 PS	£2619

+ Includes 12 months on-site warranty
Includes 3 years extended parts & labour warranty
• For additional £50, (£75 for DJ500 & 550 colour), we will convert above 3 years warranty, to 3 years on-site maintenance warranty

- DeskJet 500 Cart. Black £14; Colour £23
- Paintjet Cartridges Black £19; Colour £23

Desk Jet 500 Accessories

- 256K RAM Cartridge £69
- HP Epson FX Emulation Cartridge £59
- High Capacity Black Ink Cartridge £21
- 50 x A4 Transparencies £32
- DJ500 Colour Archimedes Printer Driver £15
- Dust Cover £6
- DJ500 does not require Archimedes Driver

Plug In Font Cartridges for DJ 500

- 22706B – Prestige, Elite, Line Draw fonts £55
- 22706C Letter Gothic & HP Line Draw fonts £56
- 22707P – Proprint Emulation Cartridge £57
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£160	£43	–	£16
BJ20	£248	–	–	£16
BJ200	£275	–	–	£16
BJ300*	£335	£88	£65	£12
BJ330*	£373	£110	£79	£12
BJC800C	£1355	–	–	£16

* Includes 12 months On-site warranty

- Spare Battery pack for BJ10E £33
- BJ10EX – Archi Turbo Driver £42

Special Offer:
Canon BJ10EX Printer + CC's Turbo Driver £199

Epson Printers

FX870	£238	LQ1170	£429
FX1050	£322	LQ2550+	£669
FX1070	£322	LX100	£117
FX1170	£POA	LX400	£90
LQ100	£144	LX850+	£134
LQ570	£197	LX1050	£199
LQ870	£352	SQ870	£409
LQ1060 Colour	£588	SQ1170	£560
LQ1070	£308		

- Tractor Feed for LQ100 £29
- Original Ribbon for LQ100 £6

Cut Sheet Feeders for

LQ570, LQ870 £47
LX400/850/LQ200/400/450/500/550
LQ1010/1070/1170 £72
LX1050 £115 FX850/LQ860 £128
FX1050/LQ1060/SQ850 £155
LQ2550 £299 SQ2550 £210

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

RS232 £28 RS232 + 2K Buffer £52

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£5
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
RS232 Leads (Various)	P.O.A.

Roland Plotters

- DXY1100 £488 • DXY1200 £620
- DXY1300 £825 • DXY2500 £2345
- Sketchmate A3 £499 • Sketchmate A4 £308
- Roland plotter Pens, Fibre tip £7.50

Fujitsu Printers

Special Introductory Offer

- B-100 InkJet – HP Deskjet compatible 300dpi, whisper-quiet & 6 resident fonts #£175
- B-200 InkJet – HP Desk Jet compatible 300dpi. Built in Cut Sheet Feeder. Optional 2nd Bin/Tractor available #£249
- DL-1100 Dot Matrix – 24 pin, 110 column Colour optional £199
- DL-1100C Dot Matrix – 24 pin, 110 column With colour option £235
- VM-800 Laser – 8 page per minute, Laserjet 3 compatible, 350 sheet paper tray, Resolution enhancement #£685

FREE 1 Year On-site maintenance, within mainland UK

- B-100 Cut Sheet Feeder £59
- B-200 2nd Bin Sheet Feeder £89
- B-200 Tractor Unit £59
- B-100/200 Ink Cartridges £14
- DL-1100 Colour Upgrade £39
- DL-1100 Black Ribbon £5
- DL-1100 Colour Ribbon £11
- VM 800 Toner Cartridge (8000 pgs) £99

Full range of Fujitsu Printers available at very competitive prices. Please telephone for details

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Telex Roll 50 metre £3

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 off, 90 x 36mm (Single Row)	£6.00
1,000 off, 90 x 36mm (Twin Row)	£6.25
1,000 off, 90 x 49mm (Twin Row)	£7.50
1,000 off, 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 off, 70 x 29mm (3 Rows x 10)	£15.50
2400 off, 70 x 37mm (3 Rows x 8)	£15.25

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC B/BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.25	£5.00
DMP2000/4000	£3.75	£4.95
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£12.00	–
LX80/86	£2.75	£4.50
LX400/800/850	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£6.00	£5.00
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
• 2 to 1	£12	£13
• 3 to 1	£16	£18
• 4 to 1	£23	£24

Professional Type

Connects	Serial	Parallel
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

Cross Over Manual Switch

2 In/2 Out Parallel	£29
2 In/2 Out Serial	£28
3 In/2 Out Serial	£36

Auto Printer Sharer

Connects	Serial	Parallel
2 to 1	£40	£45
4 to 1	£62	£49
8 to 1	–	£89

256k Multi Spooler

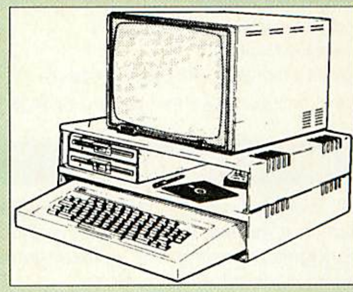
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £135 • 4 In/2 out £169
- 8 In/1 out £199

Compact Converter Units

Serial to Parallel £36 Parallel to Serial £37

Plinths for the BBC B, BBC Master & A3000

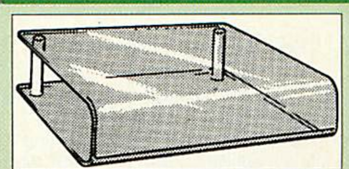


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

- Single BBC Plinth 420 x 310 x 105mm £13
- Double BBC Plinth 420 x 310 x 210mm £24
- Single Master Plinth 490 x 310 x 105mm £14
- Double Master Plinth 490 x 310 x 210mm £26

- A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive £15

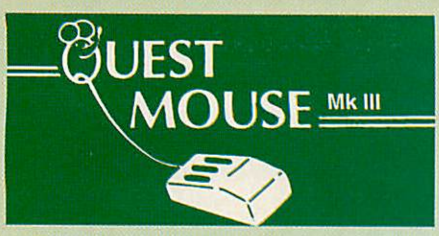
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version £16 (carr £3)
136 Column version £20 (carr £4)

Continued→ → → → → → → → →



- Quest Mouse III & Quest Paint £49
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £69
- Quest Mouse III only £25
- Quest Paint Software only £28
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £28
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)
(P.S. Conquest is a Quest Paint extension ROM).

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

Winter Sale Price £75

(BBC B, B+ and Master 128 compatible, except Master with Econet)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

Archi Mouse Port Splitter

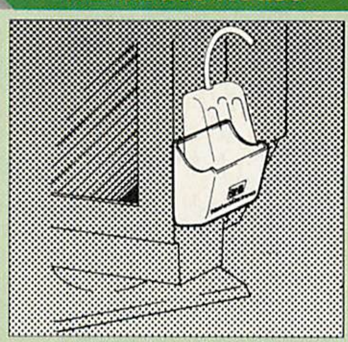
Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Mk III AMX MOUSE

- **AMX Mouse plus Super Art £49**

  (Please specify for BBC, Master or Compact)
- AMX MOUSE ONLY £25
- AMX SUPERART Package £26
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £25
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £29
- AMX EXTRA EXTRA £16
- MOUSE MAT £3

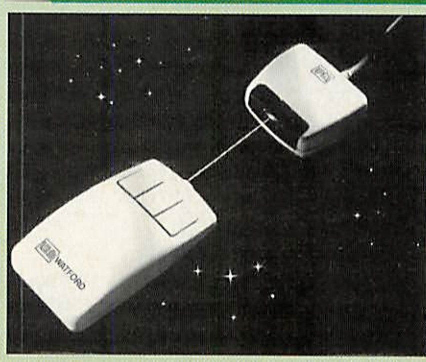
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Archi Cordless Mouse



Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

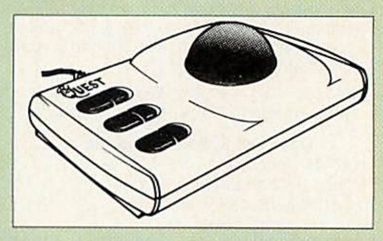
Price £39



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

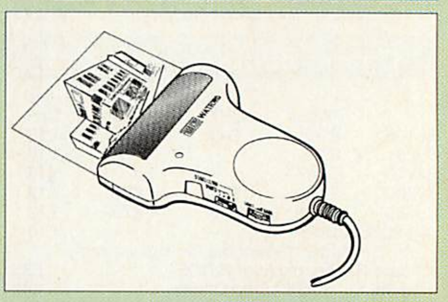
Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version £25
QT-20 Archimedes Version £26

Beeb Hand Scanner



Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

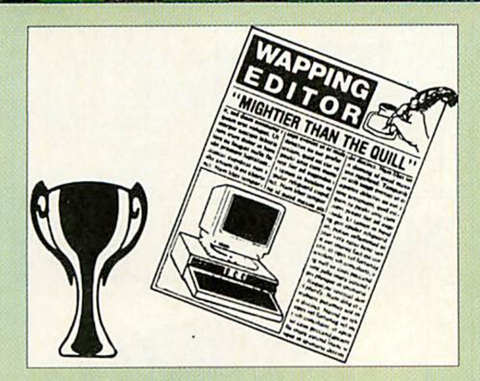
All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£99**

Archi Mk II Hand Scanner

Watford's Mk II hand scanner has a maximum resolution of 400 dpi. The scanning width is 4". The sophisticated software is supplied in a 64K ROM, located on a standard single width expansion podule. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. Other facilities include Cropping and scaling to any size including stretching and squashing in X and Y directions separately. Colour tinting. X and Y flip. Edge detection which turns solid objects into outlines.
Images can be printed on any printer supported by RISC OS.
On-screen help is provided via the RiscOS interactive help facility. (Please write in for full technical details).

AHS-4 Archi 300/400 Version £109
AHS-3 Archi A3000 Version £119



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£49**
Wapping Editor plus Mouse	**£69**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages laid out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are two Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Archi A4 Scanner



This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs. The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

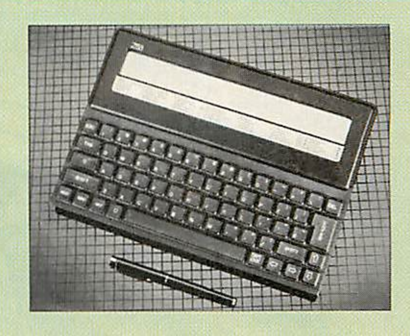
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

New Low Prices:

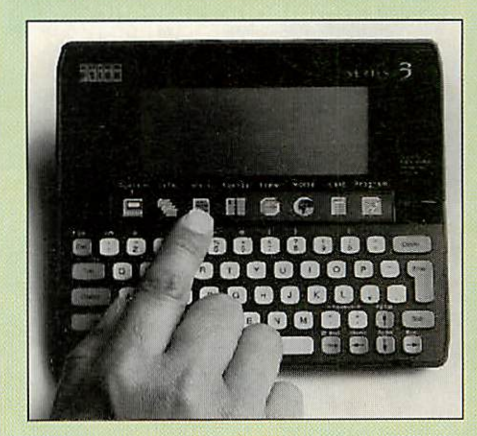
Archi A4 Scanner	£269
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£359

Z88 Portable Micro



• Z88 Portable Micro	£169
• 32K RAM Pack or 32K EPROM Pack	£16
• 128K RAM Pack or 128K EPROM Pack	£32
• 512K RAM Pack	£86
• 256K Eprom Pack	£55
• Z88 Eprom Eraser Unit	£38
• Z88 Carrying Case	£8
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£18
• Z88 to Archi Link	£15
• Z88 to BBC Link £8	• Z BASE £56
• Z88 to PC Link II £27	• Z88 to Macintosh £32
• Z88 Mains Adaptor £9	• Z88 Modem £114

Psion Series III



Psion, pioneer of the handheld computer, have once again redefined the state-of-the-art with the Series III. Although only pocket sized, this powerful programmable computer has many features found in desk top machines, plus powerful built-in software. They include a full specification wordprocessor and an outliner that is compatible with Microsoft Word, an extensive database, intelligent time and personal management and a powerful multifunction calculator. And with an interchangeable memory of up to 4Mb, you'll never be short of data storage space.

Psion Series III Computer

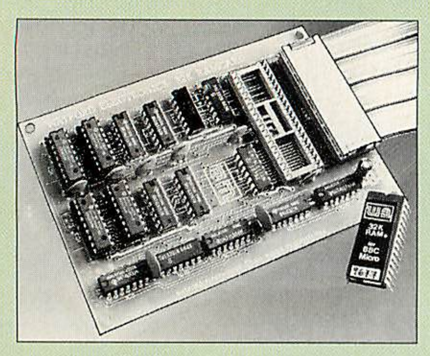
• Series 3 128K	£139
• Series 3 256K	£179



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Continued→ → → → → → → → →

32K Shadow RAM/Printer Buffer Card Expansion Board



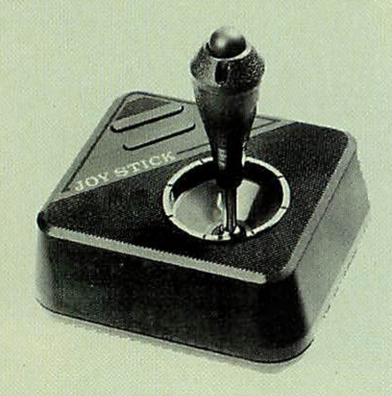
A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £49

Commander Joystick



Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

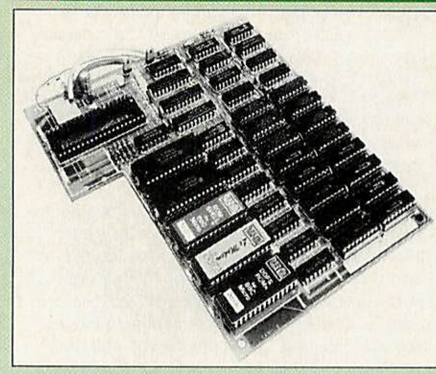
Price: £15

(PC version of above joystick available at £16)

Voltmace Joysticks

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 14B Single Joystick	£11
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24
Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	£25

ROM/RAM Card



- No Soldering required to fit the board.
- Compatible with BBC B
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).

PRICES:

ROM/RAM card with 32k DRAM	£39
ROM/RAM card with 64k DRAM	£52
ROM/RAM card with 128k DRAM	£83

OPTIONAL EXTRAS:

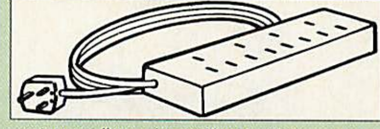
16k plug-in Static RAM kit	£8
16k DRAM for Upgrade	£13
Battery backup	£3
Read and Write protect switches	£2 each
Complete ROM-RAM card with all options fitted	£99

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightning or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

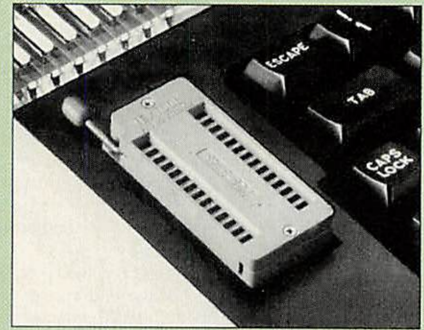
£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without having to open the lid. The ZIF socket is located into the ROM Cartridge's position. It is very simple to install. No soldering required. Also included in the price is a plastic see through storage case with antistatic lining, which allows you to store 12 ROMs.

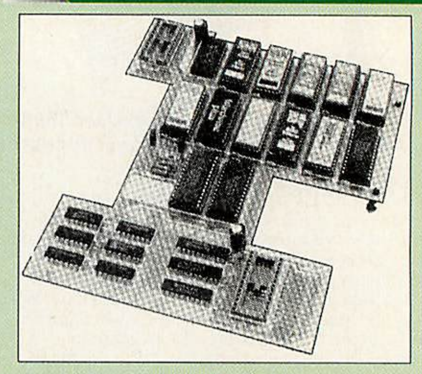
£18

ROM Cartridges for the BBC Master

Will accept the larger Piggy Back ROMs like Interword, Quest, etc.

- Twin **£8**; • Quad **£13**

Solderless Sideways ROM Socket Board



- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32

Battery Backup fitted **£35**

Battery Backup only **£3**

16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00;** Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

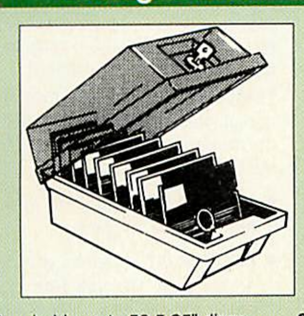
Watford POWER DUCK £8



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

All Prices Exclusive of VAT

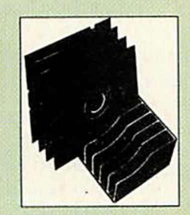
Antistatic Lockable Disc Storage Units



- **M35** – holds up to 50 5.25" discs £4.95
- **M85** – holds up to 95 5.25" discs £6.95
- **M25*** – holds up to 25 3.5" discs £4.95
- **M50** – holds 50 3.5" discs £6.50
- **M100** – holds 100 3.5" discs £6.99
- **M10** – holds 8 of No. 10 Data Cartridges £15

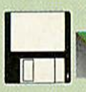
* Not lockable

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2



3M – Diskettes

Lifetime warranty on 3M Discs

- *10 x 5.25" S/S D/D 40T (744)* £5
- *10 x 5.25" D/S D/D 40T (745)* £5
- *10 x 5.25" S/S D/D 80 Track (746)* £6
- *10 x 5.25" D/S D/D 80 Track (747)* £7
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* £8
- *10 x 3.5" S/S D/D 40/80 Track* £6
- *10 x 3.5" D/S D/D 40/80 Track* £6
- *10 x 3.5" Double Sided High Density* £10



Top Quality Diskettes

Watford's life time guaranteed disc are supplied complete with self stick labels & plastic library case.

- *10 x **M3** 3.5" D/S D/D 80 Track* £6
- *10 x **M9** 3.5" D/S High Density* £10
- *10 x **M4** 5.25" S/S D/D 40 Track* £5
- *10 x **M5** 5.25" D/S D/D 40 Track* £5
- *10 x **M7** 5.25" D/S D/D 80 Track* £6
- *10 x **M8** 5.25" D/S H/D Hi-Density* £9
- ***M2** 3" Double Sided* £2.50 each

Special Bulk Offer Discs

(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£25	£30	£35
• With Sleeves 5.25"	£28	£33	£38
• 3.5" D/S D/D	£21 for 50	£39 for 100	
• 3.5" D/S H/D	£40 for 50	£75 for 100	

3.5" Disc Drive

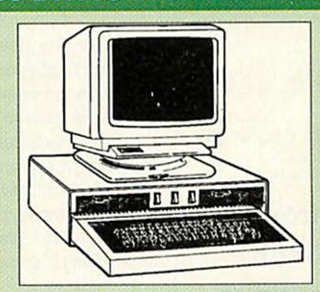


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	£59
• **CLD35:**	Twin Disc Drives, 800K	£109
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	£82
• **CD35:**	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



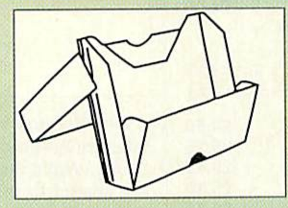
• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

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- **DW4** – Holds 40 x 3.5" Discs or 5.25" Discs £4.50

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The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

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- DFS Manual (comprehensive) £6.95
- Acorn DNFS ROM £17.00
- Acorn ADFS ROM only £25.00
- Acorn 1772 DFS ROM Kit £49.00
- Acorn DFS Kit complete £48

Watford's MkII 1772

Single/Double Density DFS

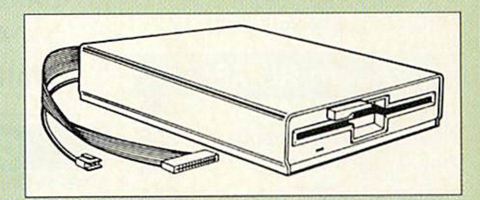
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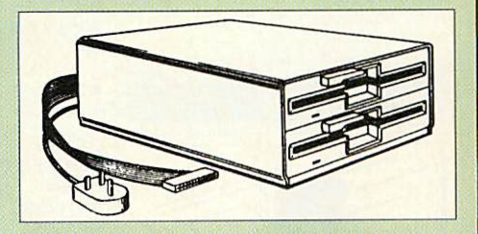
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All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).
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Our Disc Drives conform to BS415

Type	Description	
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• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£80**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£149**

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Continued→ → → → → → → → →

Computer Concept's ROMS

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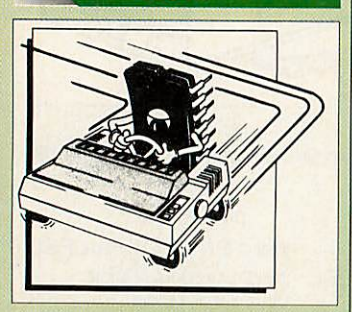
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(N.B. Word Aid requires a Disc interface in your Micro)

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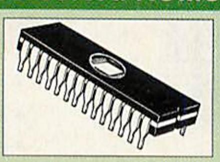
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for BBC B & B+ £12

(When ordering please specify for which Micro & 40 or 80T Disc)

All prices exclude VAT

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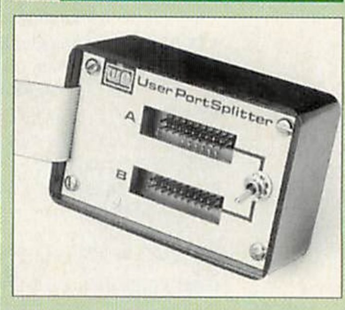
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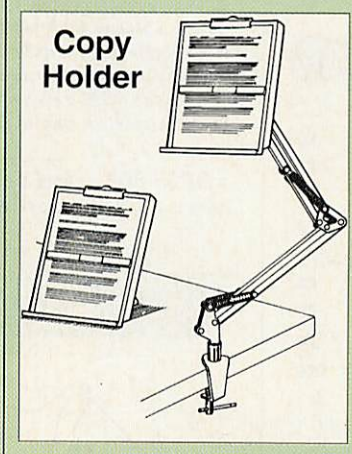
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Excellent Value at **£22**



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Although Acorn machines (such as the BBC B, the Master, the Archimedes) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quickly how, why and where the two systems (Acorn and MS-DOS) differ. As a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

Price: £9.95 (No VAT)

The Complete BBC Computer User Handbook

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Only: **£9.95** (No VAT)

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Designed for program authors to convert BBC programs to run on IBM PCs.

Price: £38

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(Now reads Archimedes Discs)

Beeb DOS is a collection of utilities which run on the PCs and enable it to read and write information on BBC Discs.

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The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included.

Price £5.95 (No VAT)

Example programs on Disc £4.95

The Epson RX/FX Printer Commands Revealed Handbook

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

£4.95 (No VAT)

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THE PERFECT ANSWER



*T*he BJ200 is a brand new black and white desktop printer from Canon, the market leaders in inkjet printing. This is a high speed, high resolution printer ideally suited to the Archimedes range of computers.

Computer Concepts supply the BJ200 with a special version of their TurboDrivers - the fastest printer drivers available for the Archimedes. The printer also includes a built-in 80 page sheet feeder. The price for the printer with TurboDrivers is just £299 + vat (+p&p) - a full £100 less than the recommended retail price.

At 360 dpi the BJ200 offers significantly higher resolution than other 300 dpi inkjet printers and at faster than 1 page per minute for a full page of graphics (or 3 pages per minute for plain text) it is also faster than other printers in its price range. And being an inkjet printer it is whisper quiet when printing.



The BJ200 with TurboDriver is the perfect answer to those users seeking the best quality prints in the least possible time, without going to the expense of a laser printer. In fact we guarantee this is the fastest high quality printer available for less than a laser printer, or your money back.

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Speed comparison table.

Comparison print times using Acorn printer drivers with a DeskJet500 against TurboDrivers with a BJ200. All times are in seconds shown on ARM3 and ARM2 based computers.

To print a 4 page document consisting of a spread of different fonts, text sizes and graphics:

	DeskJet 500	BJ200	Speed increase factor
Time to get control back - ARM3	313	59	5.3
Last page completed - ARM3	316	200	1.6
Time to get control back - ARM2	832	155	5.4
Last page completed - ARM2	834	232	3.6



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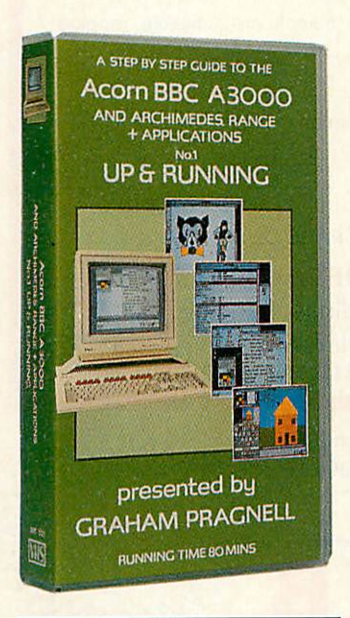
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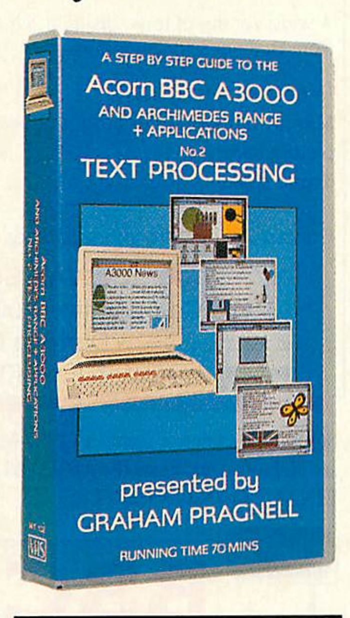
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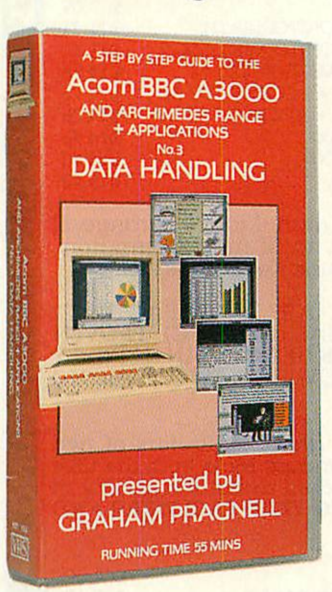
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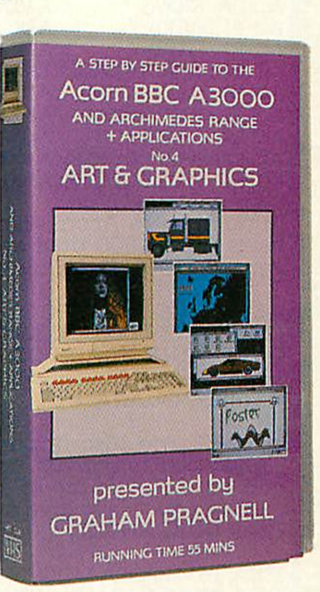


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JET ENGINES

Inkjet printers are starting to rival laser machines, offering high quality at a low price. Malcolm Brown looks at the best jets

Inkjet printers are the great white hope of the printer world. They offer laser print quality for a dot-matrix price: the perfect printer; or so it would seem.

In the past few years inkjet printers have come from nowhere to make serious incursions into both ends of the market. Currently about two million inkjet printers are sold each year in Western Europe, and they are expected to account for half the total printer market by the end of the decade.

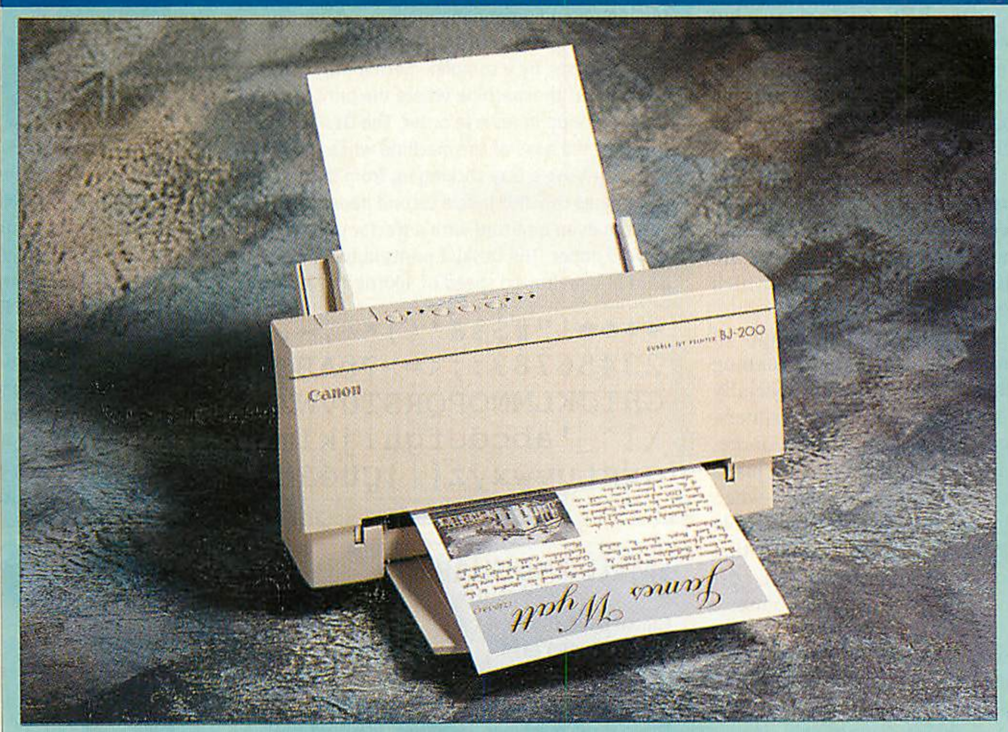
Inkjets work by squirting tiny drops of liquid ink at the paper to form inividual dots, just like both dot-matrix and laser printers. Most inkjet printers use 'bubblejet' technology, invented by Canon. The ink is heated in the nozzles by small heating coils, forming bubbles of ink vapour that force a drop of ink out through the nozzle. This technique produces very uniform droplets, precisely controlled to extremely small and accurately placed dots for a fine image.

The more nozzles in the printhead, the finer the resolution possible. The same 300dpi (dots per inch) resolution as laser printers is common and 360dpi is by no means unusual. Since there's no hammering of the paper, inkjet printers are also near-silent in operation and consume little power (so the technology is ideal for portable use).

Inkjet printers are much slower than laser printers, although their print speeds can compare well with dot-matrix machines. The printers tested here were timed printing a standard piece of text so the measured speeds in characters per second (cps) could be directly compared.



BUBBLE HEAD



Canon's latest bubblejet printer, the BJ-200, officially retails at £399, but it can be found for much less. Computer Concepts is bundling a special version of its TurboDriver with the BJ-200 for just £299. The BJ-200 is similar in many ways to the BJ-10ex and BJ-20 printers. It uses a similar printhead with 64 nozzles capable of superb 360dpi printing.

However, on this machine, the cut sheet feeder is built-in and the whole machine sits on end. Paper enters from the 80-sheet holder on the top and is fed automatically through the printer to collect face-up on a slide-out support at the front; the bare minimum of paper handling parts, but it all works very smoothly.

The BJ-200 can be used with a BBC micro or with an Arc in Basic, just like any normal printer. Used in this way, the BJ-200 produces text in three modes; draft, NLQ and the so-called SLQ. Draft print is clear and precise; certainly good enough for rough copies. The NLQ print is excellent and the SLQ a touch better; well up to the standard of any personal laser printer.

```
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```

The BJ-200 is not slow either. Draft print is churned out at a nifty 145cps, while NLQ and SLQ beat the Deskjet hollow with measured speeds of 118 and 105cps, respectively. This isn't up to laser printer speeds, but it certainly beats dot-matrix printers of this price. The BJ-200 uses Epson LQ and IBM Proprinter control codes. In LQ mode, using the dot-matrix printer driver supplied with the Arc, superb graphics images can be created, albeit excrutiatingly slowly. This is where the TurboDriver comes in. This uses the BJ-200 in Proprinter or BJ-10 mode and produces the same graphics in a fraction of the time.

The 'testcard' took over five minutes to print using the LQ driver, while the TurboDriver took just 74 seconds. However, the results from the TurboDriver are not up to the same standard. The image is more streaky, although this only really affects pictures and tints. The TurboDriver speeds up text printing even more, since it uses its own text processing algorithms. This is probably the best inkjet printer yet. Although it still suffers from the BJ economies of paper handling, whether used on its own or with the excellent TurboDriver, the BJ-200 is a fast printer and the print quality is simply superb. A winner.

There is no firmly established control code standard for inkjet printers. Many machines borrow Laserjet 2 emulation from laser printers, while others emulate the Epson and IBM standards that are found on dot-matrix printers.

JETS ON THE ARC

Most inkjet printers for the Archimedes are used in graphics mode, treating the onscreen fonts of the Arc as graphics images. This is a slower way to produce pages than treating text as characters – as the BBC micro does – but superb results are possible, and inkjet machines make excellent printers for producing the occasional DTP page or *Draw* diagram.

The Laserjet printer driver supplied with the Arc worked well with HP-compatible inkjets, and Epson LQ drivers are available for the inkjets which use those codes.

The main disadvantage of inkjet printers is their running costs. The ink used is specially formulated for these printers, and expensive. What's more, in most machines it's not just a reservoir that is replaced when the ink runs out, but the whole printhead. This means that some inkjet printers can cost as much as 12p a page to use.

The Epson LQ-870 is one exception. This is Epson's inkjet answer to the dot-matrix and it looks and operates just like the LQ-870 dot-matrix models. On this machine just the ink reservoir is replaced and that results in a price per page of just 2p; about the same as most laser printers.

The paper that you use can also add expense. Inkjets can print on any paper, but for the best results, without the occasional blotting that ruins high resolution printing, the correct – and expensive – paper should be used.

The plus point is that the initial cost of an inkjet printer is quite low, and it's always worth shopping around for a cheaper 'street' price than the 'official' prices quoted here. Also, thankfully, ink cartridge prices are falling. As the abilities of these machines gets ever greater and the prices fall, their future looks set to be rosy and their appeal to Acorn users is never greater.

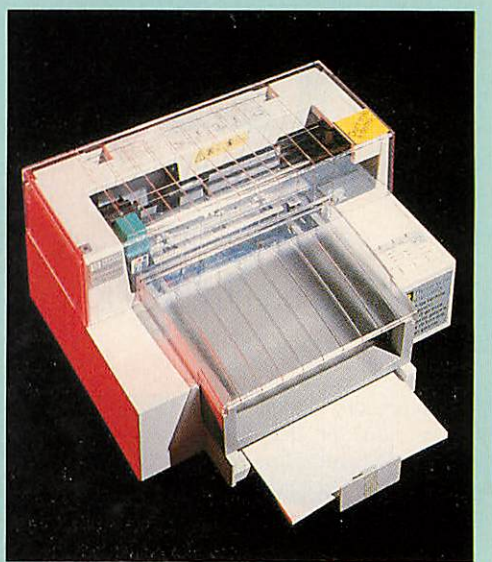
OLD ORIGINAL

Hewlett Packard Deskjet 500 £425
Olivetti JP-350S £499
Citizen Projet £496

The HP Deskjet is the machine that established inkjet printing as a viable option. The original machine has evolved into the current Deskjet 500, shown on the right, and spawned a couple of clones. All three are available heavily discounted; the Deskjet 500 can be found for as little as £250. They share many features. The most important is the 50-nozzle printhead. This produces text and graphics with a resolution of 300dpi. The printhead also includes the ink reservoir, and the whole unit is replaced when the ink runs out, costing about 6p per page.

All three machines use cut-sheet paper fed from a 100-sheet tray by a complex mechanism to a tray at the front of the machine where the printed sheets collect face up in reverse order. The Deskjet's paper tray is in the base of the machine while the JP-350S and Projet use a tray sticking up from the top. The two clones can also take a second paper tray (£125) and can even be fitted with a tractor unit (£80) for fanfold paper. The Deskjet prints in two modes; draft print at a measured speed of 100cps and NLQ at

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67cps. The other two machines also offer high-speed draft print at 125cps. The quality of all modes is excellent and the NLQ is hard to tell from laser printer output. All three machines use the Laserjet 2 control codes that are standard for laser printers and supported by the Laserjet Archimedes printer driver. Epson FX and IBM Proprinter emulation cartridges are available for about £70 each. The range of fonts built-in is limited, but adequate for everyday use.

These machines make excellent inkjet accompaniments to an Archimedes. Text and graphic print quality is very good and, although these inkjets are not as fast as laser printers, they are quite fast enough for most uses outside the commercial office.

SMALL AND SHARP

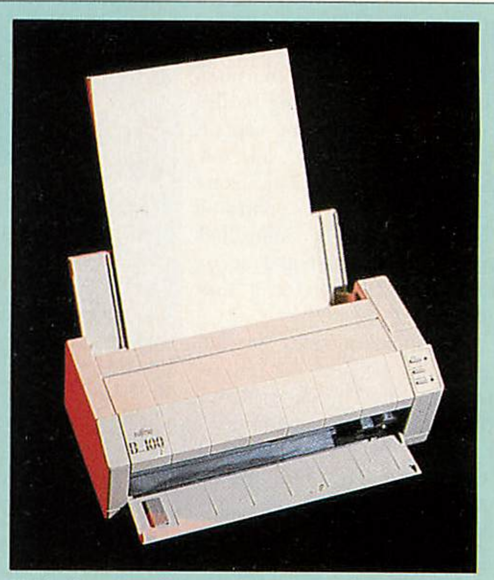
Fujitsu B100 £349
Olivetti JP-150 £339
Integrex Betajet £335

These three machines are almost identical, and also close cousins of the Deskjet. Although HP itself does not sell this printer type, it manufactures the key parts. The 50-nozzle printhead is the same as that used on the Deskjet, so the resolution is the same 300dpi. This also means they are as expensive to run at about 6p per page printed.

Although they use the same print 'engine', these are much smaller than the Deskjet clones, but the B100 can produce text and graphics every bit as good, albeit at a slower speed. The B100 uses cut sheet paper fed into a slot behind a fold-down flap. Printing more than a couple of pages is tedious, but a £70 automatic sheet feeder is available.

The B100 shown prints text in two qualities, draft and letter quality, at a speed of 71 and 50cps respectively; not fast by any standards. Printing graphics is also slow. The draft text is about the quality you'd expect from a 24-pin printer in NLQ mode but the

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300dpi letter quality print is pretty much as good as any Laserjet 2-type laser printer. Three built-in character styles are provided and others can be plugged in on smartcards for £55 a time. Most Acorn users will print Arc fonts in graphics mode anyway. The B100 uses Laserjet 2 codes.

The B100 and its three brethren apparently provide excellent print quality for a bargain price. Although they are cheaper than Deskjets, when the extra sheet feeder is taken into account, along with the slower speed, the choice is not as clear as it first appears.

PRECISE AND PORTABLE

Kodak Diconix £429

The Diconix 701 stands apart from the rest of the inkjet crowd as a machine which is neither a copy nor copied. It is not much to look at but this printer performs like a laser printer and it can be carted around to accompany your A4 laptop too. The 701 is equally suited to life on the road or on a desktop; a home and away machine. It is small, with an A4 footprint and about 3in thick – and light too – less than 3kg.

The printer is powered by a rechargeable camcorder battery, or a mains adapter (which doubles as the charger). Just cut sheet paper is used but this is fed from an automatic sheet feeder which unfolds from the printer top; extremely compact to carry but efficient in use. Like the Deskjet series it has a 50-nozzle printhead capable of 300dpi resolution and it uses Laserjet 2 codes.

The Diconix 701 really can stand in for a laser printer. There are two qualities of print available; a clearly readable draft and a simply excellent NLQ. Three fonts are provided and, of course, the sky's the limit if this is used with an Arc in graphics mode. The only drawback is its speed. Draft text is produced at a measured rate of 92 characters per second (cps), or about two pages per minute. However, the NLQ mode is close to the Deskjet's at 66cps (about 1.5 pages per minute).

The printhead incorporates the ink reservoir and the whole unit is replaced when the ink runs out – after about 400 pages – for £25. As well as Laserjet codes, the 701 also uses Kodak's own control codes and emulates the IBM Proprinter. The Diconix 701 is not to be found discounted as much as the Deskjet series and is not quite so attractive a proposition. However, if portability is required, there's little to touch it.

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THREE OF A KIND

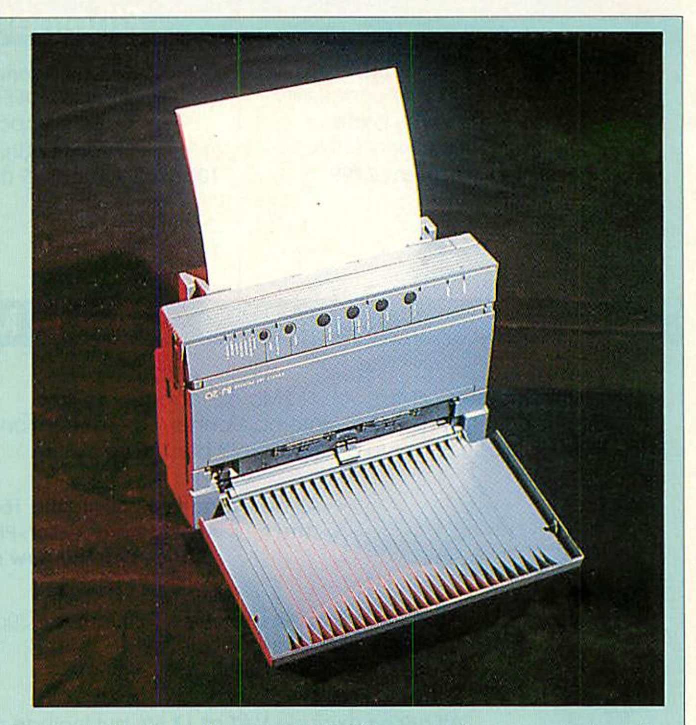
Canon BJ-20 £399
Canon BJ-10ex £299
Star SJ-48 £345

These three machines are closely related to one another, although they are not identical. The BJ-10 was the first mass-appeal portable inkjet printer and the BJ-10ex is an evolution of that basic design, the SJ-48 Star's version and the BJ-20 Canon's latest incarnation, shown on the right. All three look similar; the size of a small portable typewriter.

A rechargeable battery means these printers can be used on the move, but the 50-sheet feeder (£54 with the BJ-10ex and SJ-48, but included with the BJ-20) which clips onto the printer in an upright position is not really suitable for journeys.

These machines use a 64-nozzle printhead capable of a resolution of 360dpi but, strangely, only 48 nozzles are used for text. The whole printhead is replaced when the ink runs dry and this produces a typical cost per page of about 7p. There are two printing modes; draft and NLQ. On the BJ-10 and SJ-48, the draft mode is purely to save ink and is produced at the same speed as NLQ; about 50cps. The BJ-20's draft mode is actually faster at 83cps; still not exactly racing along, but the print quality is excellent. The BJ-20 offers seven character styles in each mode, the BJ-10ex four and the SJ-48 just two. All three machines use the Epson LQ, IBM Proprinter and Canon's own control codes so they can be used equally well by Beeb owners or RiscOS users with an LQ printer drivers. The Canon BJ-20 is the most expensive, but it offers the best deal, with sheet feeder included and a genuine draft mode.

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JOHN BRENNAN

THE **FLOPPY** FACTOR

Hard discs aren't everything. Alan Glover offers a host of reasons why a second floppy drive may be a good idea

There are a number of reasons for adding an additional floppy disc drive to a computer system which only has one floppy drive (and probably no hard disc drive).

In this article we take you through the various advantages and also look at the fine details and pitfalls awaiting the unwary.

Unless indicated otherwise, all comments apply equally to Risc OS 2 or Risc OS 3 systems. For a start, here are some reasons for adding a second floppy disc:

Please insert disc . . .

Don't you just get sick of this message? With just one drive it is inevitable that disc swapping will have to happen.

However, the majority of disc swapping is to access regularly used directories like *!System*, *!Fonts* or *!Scrap*. By putting these three onto a disc which is usually left in drive one and clicking on drive one's icon at the start of a session you will eliminate all these messages in one stroke.

When using Risc OS 2 it is important to Dismount (on the floppy disc menu) a floppy disc which is not going to be used again for a time.

This can avoid occasional errors, and also avoids the aggravation of being asked for a disc which you used half an hour ago and is now buried underneath a pile of printout or in an envelope waiting to be posted!

More storage

A normal 3.5in floppy drive can hold slightly under 800K of data after formatting. By adding an additional drive you can double that figure, which allows much more data to be

SETTING UP

The best approach I have found is to keep regularly used items like !System, !Fonts, and !Scrap on a disc in drive one, together with any applications which you are almost certain to use every session (for example: *Edit*, printer drivers and so on). Remember to leave some free space on the disc for scrap files within the !Scrap directory.

At the start of every session click on the ':1' floppy disc icon to open a directory viewer on the disc contents and register the presence of the applications with the computer. It is possible to make this happen automatically by arranging an auto-boot sequence – see 'Autobooting a twin drive system'.

Drive 0 is used for transient data/programs which are not needed for every session, and is also available for use with those discs (typically games) which insist upon being used in a specific drive and filing system.

The Drive 1 disc is critical to the smooth running of this scheme; so make sure that you have a backup of copy of it, and all other important discs. Floppy discs are not indestructible.

handled without needing to swap discs.

Dos access

By adding a 5.25in drive you can accept 5.25in Dos-formatted discs. If you are using Risc OS 2 you will need additional software (such as *MultiFS*, supplied with *PC Soft*; the new name for the *PC Emulator* package).

Risc OS 3 can automatically detect and access DOS discs within the desktop.

Beeb access

Although it can be useful for transferring files in the desktop, the best use is within the 6502 Emulator (*65Host*).

You will also need additional software to interpret the discs; Risc OS 2 and Risc OS 3 do not support DFS format as standard.

Going high-density

Risc OS 3 can support high-density drives given suitable hardware, providing access to MS-Dos 1.4Mb format and ADFS F format, which provides about 1.6Mb per floppy disc. However, the floppy disc controller (1770/1772) used in Acorn computers before the A5000 cannot work at high density, so additional hardware is needed in these computers.

High density floppy discs usually have a 'HD' logo and an additional hole on the opposite of the label space to the write-protect slider.

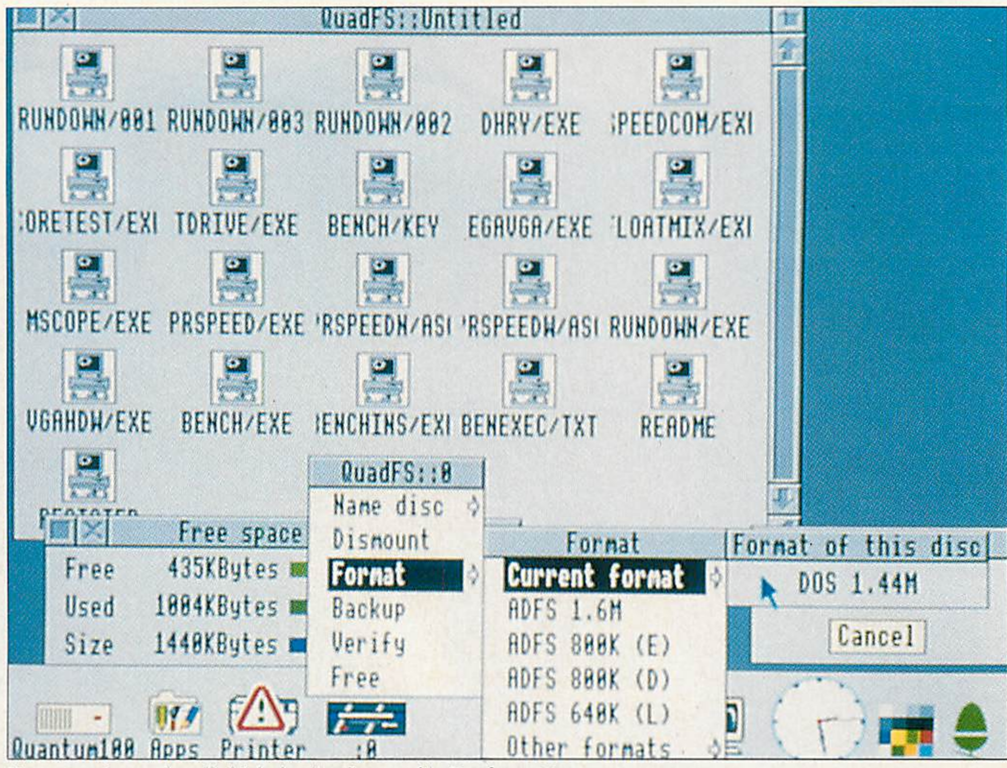
Easy file transfer

On a 1Mb computer, copying the contents of a full 800K disc on to another disc is very rarely achieved with one disc change; most 1Mb machines in fact have between 600 and 700K of free memory when in normal use. However, this is often less if the font, sprite or module areas have significant allocations of memory.

With two drives, the computer can take as many passes as it needs to move the data without needing to ask you to swap discs at all.

HOW TO ADD ONE

Every new Acorn range of computers is an advance upon previous designs and an unfortunate but inevitable side effect of this is that the whole issue of what can be added to which computer is rather complex. The procedure for each of the Acorn 32-bit range is given here in detail.



Now your Arc can handle high-density discs; and in Dos format too

A305/A310

A second 800K 3.5inch drive may be added inside the computer. However, a new front panel with a slot for the second drive is needed. This means that an Acorn upgrade is the only practical internal route. If a hard drive is fitted, the only option is an external drive.

If you want a 5.25in drive – or a 3.5in and you don't have a new front panel – it must be externally cased and separately powered, and should be driven via a disc buffer board of some type to boost the signals from the disc controller.

Alternatively, if you want to fit an internal high-density drive, you must have additional hardware (including a different disc controller) and Risc OS 3 fitted.

A440

A hard disc drive is fitted as standard, so the obvious option is an external upgrade, using a disc buffer board. Or you can replace the existing internal floppy drive with a high density drive and supporting software.

A3000

There is no space inside the case for a second floppy drive So once again it is the realm of the external floppy with additional hardware as in the

AUTO-BOOTING

This assumes that you have !System, !Fonts, !Scrap, *Alarm* and *Edit* on a disc in drive 1, which you want autobooted. You want to have *Alarm* loaded when you start up.

Create a directory called !Boot on the drive 1 disc.

Load *Edit*, and create an Obey file. Put the following in it:

```
| Drive 1 autoboot file 1
|
| add anything you want done before the desktop starts up
set Root$Dir <Obey$Dir>.^
desktop -file <Obey$Dir>.DeskStart
```

Save this file as !Run within the !Boot directory. Now create a text file, and put the following into it:

```
run <Root$Dir>.!System.!Boot
run <Root$Dir>.!Scrap.!Boot
run <Root$Dir>.!Fonts.!Boot
run <Root$Dir>.!Edit.!Boot
run <Root$Dir>.!Alarm
```

Save this file as DeskStart within the !Boot directory. You may also wish to create a suitable !Sprites file to go inside the !Boot application.

Press F12 to enter the command line facility and type the following (press RETURN at the end of each line):

```
configure language 0
configure drive 1
configure boot
configure dir
dir :1
opt 4,2
```

Press Return again to go back to the desktop. The autoboot sequence has now been set up. You can test it by saving any edited files, and then pressing CTRL-BREAK.

Note that some games and application software will insist upon other configuration settings (or even change them without telling you!). If you find that your autoboot sequence has stopped working you should check that all the configuration options above are still in effect.

previous two cases. Please note however that the expansion card size is different.

A410/1
A different design of front panel, but otherwise the same as the A305/A310.

A420/1, A440/1, A540
A hard disc drive is standard, so an external upgrade is the only option.

A5000
The first Acorn machine to use the 'new style' I/O hardware. A second floppy drive may be fitted internally, and up to two more externally. High density drives may be fitted, as can various types of 5.25inch drive. A buffering board is not essential but it helps to limit electro magnetic interference: it also allows you to detach the external drive without removing the computer's cover.

A3010, A3020, A4000, A4
It is not possible to add a second floppy drive to the onboard controller and the standard drive is high-density.

Something to bear in mind is that the above table contains the expansion options as they stand at present. A number of third parties are advertising additional hardware which will provide a new filing system, new floppy disc controller and a high density floppy disc drive. In some cases this may be in addition to the standard drive or it may replace it. The latter option must be regarded with caution, since some software will insist upon running from ADFS drive 0.

Another confusing question is: does a high-density disc upgrade require Risc OS 3, or does it provide its own filing system which can work with Risc OS 2.

The answer to this will vary from product to product, but some general points can be made. Firstly, ADFS in Risc OS 3 can recognise high-density floppy drives, given the suitable hardware. Fitting Risc OS 3 does not immediately make an existing 800K drive capable of handling high-density discs at 1600K.

ADFS in a Risc OS 2 computer is not capable of using high-density floppy disc drives, nor will the hardware be capable of it.

Upgrading a Risc OS 2 machine to use high-density floppy drives will entail an expansion card with a new disc controller and a new filing system to drive the new disc controller.

HOW DOES RISC OS 3 HELP?

Risc OS 3 contains driver software for high density floppy disc drives. Risc OS 2's ADFS is only aware of 800K disc formats.
Risc OS 3 can recognise DOS and Atari formatted discs automatically in the desktop; you do not need any additional software such as *MultiFS*.
Risc OS 3 can perform backup, format and verify operations on a floppy disc without halting the desktop multitasking (though it is possible to if you prefer).
Risc OS 3 provides a multitasking copy facility which copes much better with disc swaps since it will generally read in files until its memory area is full and then write all those files out in one go.
With Risc OS 3 key applications such as *Edit*, *Paint* and *Draw* are inside the Risc OS 3 Roms, so they are always available.

WHAT NEXT?

The temptation to find a cheap floppy disc drive in the pages of a magazine and try and fit it yourself is obvious. However, the notes above should have made it clear that there are other factors you must take into account when putting an upgrade together yourself, including:

- Do I need any additional software?
- Can my hardware support this drive?
- What cables do I need ?
- Do I need an external case and power supply?
- Do I feel competent to do it myself?
- Will I invalidate my warranty if something goes wrong?
- Do I need 'real' hardware; spacers, pillars and so on?

For more details on adding floppy drives, why not send off for the Acorn Support Group Application Note number 208, by writing to Acorn Customer Services, Fulbourn Road, Cherry Hinton, Cambridge, CB1 4JN.

THE ARXE SOLUTION

Product: Alpha Series
Supplier: Arxe Systems Tel: 081-534 1198
Prices: HD floppy controller £109 + VAT; HD drive £50 + VAT, HD controller + SCSI £199 + VAT

Acorn is certainly to be applauded for introducing high density, or HD, floppy drives in its latest computers. In fact, Acorn has squeezed out marginally more than most from its HD drives; its 1.6Mb format provides 160K more space than the PC high-density format, for example. Risc OS 3 recognises PC high-density discs as well. But where does that leave the hundreds of thousands of Acorn users, like me, who are stuck with the old 800K drives?

Arxe Systems has sold a high-density floppy disc controller upgrade for a while now, but it's fair to say that Arxe's first effort was a little expensive, and the long drawn out introduction of Risc OS 3 confused the compatibility issue. Arxe Systems' second-generation Alpha Series looks much more attractive. The Alpha Series is available as either a HD floppy controller or 16-bit SCSI controller on its own or as a combined (Alpha Dual) HD and SCSI interface.

The SCSI or HD-only versions can be upgraded to Alpha Dual specification at a later date; useful if your budget is tight. The Alpha Dual was supplied for review and it was installed into a three year old upgraded A420/1. The Arxe podule ousted an existing uncached 16-bit SCSI podule mated with a 105Mb drive and scanner.

Three IDC connectors are provided to hook up a maximum of two HD floppy drives and a SCSI hard drive. A standard SCSI connector for external peripherals, like the scanner or a CD-Rom drive, for example, is situated on the podule backplate. Arxe supplied an off-the-shelf Citizen HD drive which neatly replaced the standard 800K drive in my machine. Owners of original A300 or A400-series machines will require a new plastic front panel to accommodate a new-style HD floppy. Alternatively the HD floppy drive can be housed as an external unit.

As we were completely replacing the old 800K drive, ADFS floppies was configured to 0 and then the Arxe filing system, QuadFSdrives, to 1. On the Risc OS desktop the old familiar ADFS floppy drive icon is substituted by the rather less subtle Arxe Systems QuadFS icon. Quibbles about the Arxe icon design apart, everything eventually worked as expected; only problems being that the supplied drive was switched as drive 1 instead of 0 (easily fixed) and the early firmware on my card had a minor bug which prevented Risc OS from booting on power up. I'm assured the latter problem has since been fixed. One noticeable point is that by default the Arxe card does not wind-down the hard drive after a DISMOUNT command. Arxe says modern drives don't need this feature.

Being, ahem, an occasional PC user these days, it was a welcome sight to see the contents of one of my 1.44Mb PC discs being displayed on a Risc OS directory window. One small niggle here is that, as with Acorn HD floppies, there is a lengthy pause when a PC disc is 'seen' for the first time. The 1.6Mb Acorn format is supported by Arxe's hardware, so I can now send HD Acorn format discs to friends and acquaintances lucky enough to have a newer Acorn than me. Overall it seems that QuadFS hooks into Risc OS 3.1 very neatly.

SCSI hard drive performance is not noticeably different to my old card. In fact, one existing problem has been alleviated by the Arxe podule. Some uncached SCSI designs use a lot of processor interrupts. This makes the serial port unreliable when using fast speeds like 19.2Kbps; especially if you're using a high-resolution screen mode. The Arxe card has effectively made the serial port less unreliable; an important point to consider if, for example, a high-speed modem is often used.

In summary, Arxe has an excellent product for users of older Acorn Risc computers and apparently work is now under way to add Mac SuperDrive compatibility as well.

Ian Burley

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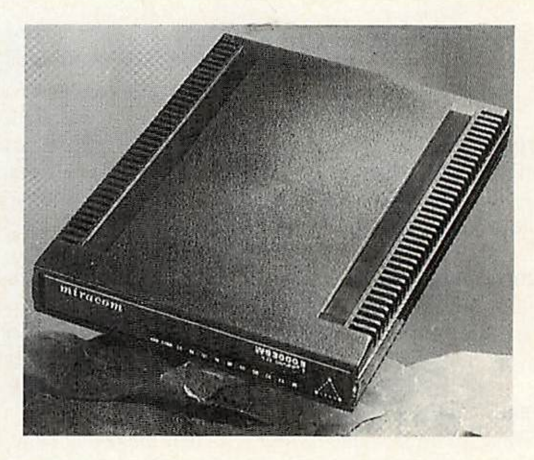
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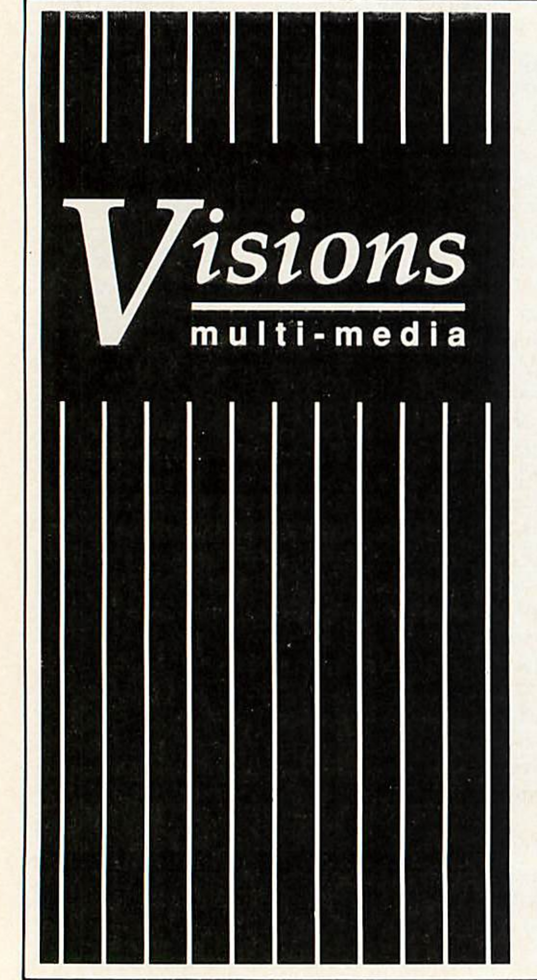


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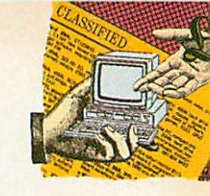




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● Master 128, ACorn/Philips monitor, 40/80 disc drive. Contact Mr I Mackay, London W9. Tel: 081-969 7294

● 1st Word Plus V2 – £22, Genesis Plus – £15, Nevryon, Pacmania, Articulate, Arctist, UIM, Trivial Pursuit –£5 each, Delta Cat joystick – £15. Contact Mr N Fazakerley, Harrow. Tel: 081-864 0309

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● Could Mike Smith please contact me again, I have formatted his disc! Andi Wall, 98 Headstone Lane, North Harrow, Middlesex Ha2 6JN. Thanks

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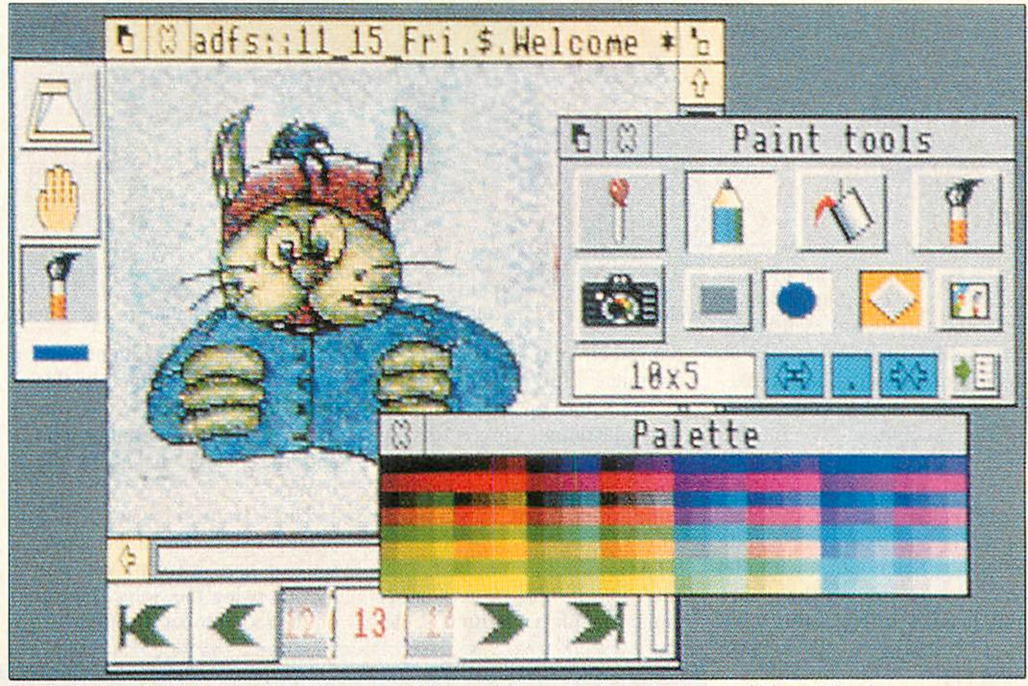


MOTION PICTURES

Pete Worrall experiences the future of movie direction

It's interesting that most of the excitement in using a computer system is generated through anticipation of the movement on the screen. Cartoon lemmings may hold up their hands and explode, real tigers growl in video sequences on CD-Rom and small fish swim across my screen. I don't notice. I'm busy changing the colour palette of my latest video masterpiece, and I can't wait to see what it looks like.

Most examples of moving pictures or demos on the Arc are from software companies, magazine publishers or they come from public domain libraries and are variable in standard, subject matter and motif. It suddenly occured to me that maybe the time was ripe for home-grown movie-makers to be nominated for a computer Oscar.



Pupils designed videos around a wide range of themes: this one took on the issues of life and death

The Sandwell Pupils into Technology Project provided a great chance to investigate animation on the Arc. The structure of the project was outlined in a letter to all secondary schools, inviting a design proposal based on the theme of 'Motion Pictures'. The projecy included three weeks pre-planning and support in school followed by two days at the Educational and Microtechnology Unit.

To break the ice, I suggested that the theme be open-ended, but might include 'moving' graphics, geometric shapes, images from video tape, cartoon sequences and slide projections.

Five schools responded immediately with some challenging and various proposals as follows : decay and erosion using organic human or environmental subject matter; dreamworlds with superimposed digitised figures walking around inside paintings by the painters Vermeer and Magritte; 'A Dance to the Music of Time' with dance and costume from different cultures and periods; birth and death; and an idea emerged for a school promotional film.

A maximum of four pupils (who came from years 7, 8, 9 or 10) and one teacher per school were available for the project and the final results will be made available as source material for schools in Sandwell.

During the next three weeks my task was to familiarise both the pupils and teachers with new software, techniques and objectives for the project, as a confidence building exercise. The most important aspect of this preparation was the notion of the project as a 'time-based' activity relying on each and every picture telling a story, contributing toward the whole film. Teamwork was therefore an essential ingredient in the production process.

Revelation 2 provided the perfect front end for demonstrating single-frame animation and editing techniques because up to eight screens could be displayed at any one time (I'll explain more about this later).

Films using *Draw* files, sprite files and digitised sequences were screened in class with pupils. They developed ideas quickly, and these showed an incredible variety of approaches; for example, Wood Green High School Year 9 girls decided on a sequence showing stages in a dance routine for digitising, whereas Alexandra High School was producing sculpture in plasticine for scanning.

All of the schools worked hard on design drawings and storyboards for the main event. Briefing sheets were then produced, outlining rooms, hardware and software, *Revelation 2* (from Longman Logotron), *Splice* and *Tween* (from Ace Computing) for use in one room with 12 Arcs, (These were all A310s equipped with 40Mb hard discs)

The second – video – room had *Image Animator* software (Iota Software) running on the Iota colour image scanner linked to an A5000, plus a 2Mb A3000 linked to a Pineapple colour digitiser with two Panasonic video cameras and a slide projector.

An art room was also available for planning and designing during the two-day project. The timetable ensured that all schools had sufficient time to explore both rooms during the two days.

Interactive use of the art room and the video room was encouraged. The video room came into intensive use because of the live excitement generated by scanning and digitising. So the cameras rolled and take one on day one began . . .

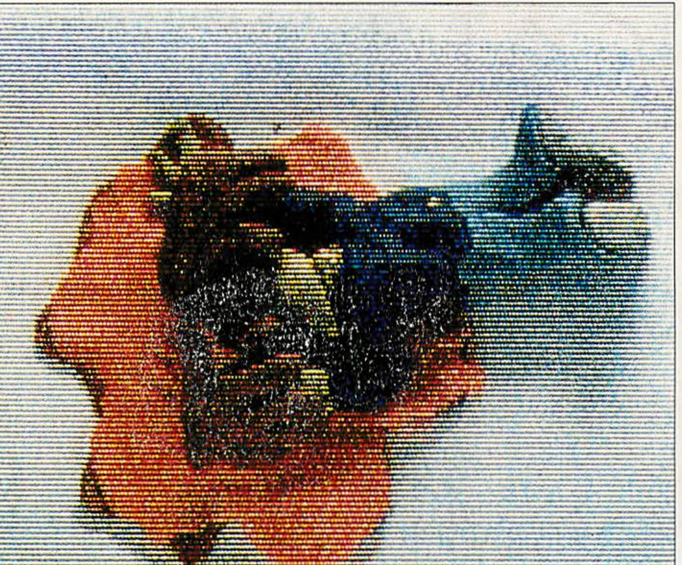


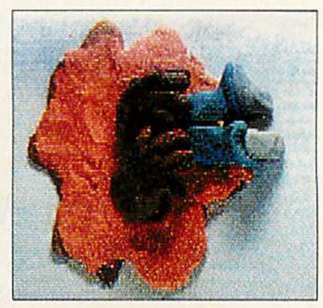
Digitising photos was a favourite

WELCOME

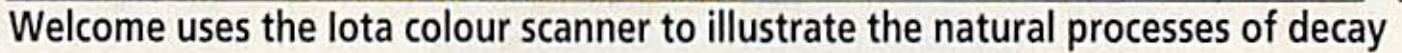
Equipment: Iota Image colour scanner plus *Image Animator* software
School: George Salter High
Authors: Richard and Ranier (pupils)

Diary Entry: 'Our animation sequence was based on the theme of life and death. We went into a room and this man called Alf showed us the scanner. We decided to go to the art workshop to create characters out of plasticine.'









Welcome uses the Iota colour scanner to illustrate the natural processes of decay

STAGE 1
The Iota Image Colour Scanner was used in this project because it is capable of scanning not only two-dimensional things like photos but actual three-dimensional objects like sculptures.

The sculpture is placed under the scanning head and, with the image display software loaded, the scan area can be easily and exactly selected. Select the Scan option with the red filter setting on the scanning head, and repeat this with the green and blue filters to complete a full colour scan.

The scans on the left show the plasticine figure diving into a slab of clay, with two hands welcoming (or perhaps pulling) the figure down.

STAGE 2
Iota is an easy-to-use newcomer to the animation scene and contains an excellent editing and playback panel. In this case the scanned work was dragged onto the animator icon and the player displayed the frames.

The frames were then played using the green chevrons or they were moved one by one using the Select button on the red number display. Additional frames can be inserted or you can draw over to edit existing scans. Iota's excellent art animation package is compatible with Ace Computings' *Splice* and *Tween* packages.

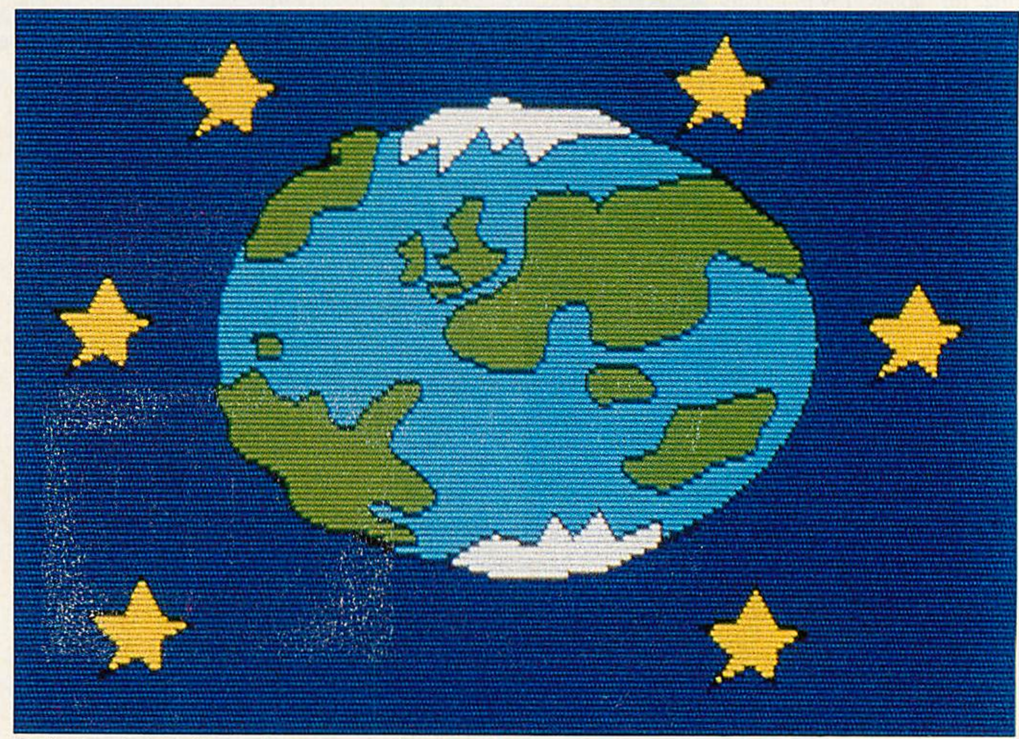
A result of this technology was that *Welcome* could be made entirely with scanned drawings and sculpture.

EARTH

Equipment: Tween and Draw software
School: Alexandra High
Author: Ms. L Hall (teacher)

Tween is a powerful animation program that produces a smooth metamorphosis from one *Draw* file to another. What's more you just need one drawing to make a film.

Draw is available on the applications disc and is an object-oriented draw program. This means each object drawn has its own characteristics and can be scaled, remodelled, recoloured and also grouped together as a single object. *Tween* uses this principle to brilliant effect.



Earth: the principle of tweening transmutes the planet into an apple core

STAGE 1
The *Earth* drawing formed the basis for the film. The next task is to alter the drawing, without adding any new lines. In this case the stars were changed into the sun and the earth reduced in size to become an apple core.

The Adjust button on the mouse will select and alter points in the second drawing,

STAGE 2
After loading *Tween* onto the icon bar, you must then create a directory to contain your film called Demo. Select Tween and New Action and drag to the new Demo directory. This will create a film spreadsheet with frames numbered from 1 to 256.

The two *Draw* files were placed as frame one and 50 respectively, and act as key frames. This software will generate the 48 in-between frames automatically. Each frame can be viewed and modified. The resultant film will also interpolate colour changes. It is also compatible with *Splice*.

DANCE

Equipment: Pineapple colour digitiser plus Pineapple disc 2 and Revelation 2
School: Wood Green High
Authors: Rejbinber, Claire, Kelly and Shila (pupils)

Diary Entry: 'After the briefing, we worked on our dance sequence. We were then shown how to project colours onto our costumes using inks and washing-up liquid.

'With the help of the teachers we saw our short film being put onto the computer and we grabbed the frames we liked and then saved them on to a disc.

'We spent the afternoon learning about the different ways we could alter each one of our graphic frames and get different colour effects from using different programs. This made our frames come to life and gave them a more party-like feel.'



Wood Green used Pineapple hardware and software to give that party feel

STAGE 1

Pineapple's applications disc 2 is supplied with the digitiser. The software on it allows sets of images to be grabbed, displayed and played back on screen.

In this case a video camera recorded the dance and the pupils decided how many pictures they should grab. The sequence menu allows for a time delay setting (this delay amounts to a minimum of every fifth frame on a 2Mb machine).

Pineapple Software supplies a video player program to view the resultant movie and it is easy to save or delete individual frames from it. The saved sequence looks like one sprite file and can be loaded into *Splice* and converted into a film.

STAGE 2

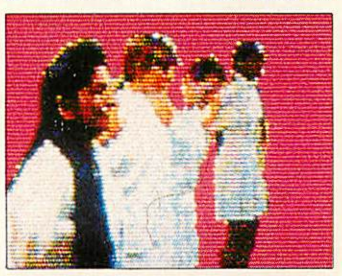
The frames on the right have been loaded into *Revelation* 2 for editing and then reloaded into Ace Computing's *Splice* and saved as a film.

It is worth considering that the special effects employed by these school pupils, although used on a microcosmic scale, are exactly similar to those used by the professional world of television and the film industry.

In this sequence, the pupils used bright colours in the background to highlight themselves dancing. The edited sequence was then 'spliced' (no pun intended) back into the film.







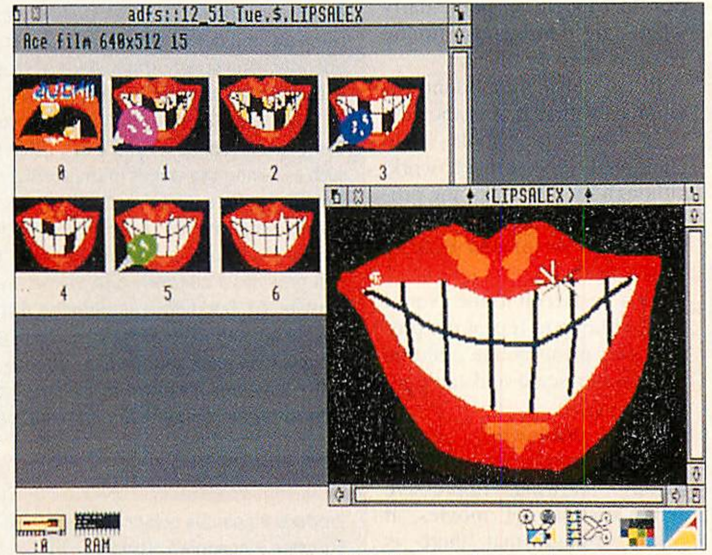


LIPS

Equipment: Revelation 2 and Splice
School: Alexandra High
Authors: Lee and Lisa (pupils)

Diary entry: 'First of all we started to mess about getting used to *Revelation 2*. Lisa and I drew a pair of lips with a bright smile and did him eating lolly pops with his teeth getting bad and in the end he only had two teeth left in his mouth and then we saved it onto disc.

'It turned out really well.'



Lips, drawn with Revelation, warns of the dangers of not eating sweets

STAGE 1

Lips was created using this guide . . .

- Select Revelation 2 Icon
- Select Create Page
- Select Scale Icon (top right hand corner of page one)
- Draw the first frame. Use your preparatory drawings to help you
- When finished, select scissors on the Tools menu and two clicks with Adjust on the Mouse will auto-cut your frame
- Select Create Page (2)
- Use menu mouse button on *R2* Icon; select Stack to place new frame on top of the first.
- Carefully place your pic in the frame and proceed with the next frame. Repeat.
- Flick-book movement is simulated through selecting the top left icon on the page
- Save all the Sprites

STAGE 2

Splice animates *Sprite* files. The sprites can be created in any paint package and saved in a numbered sequence,in this case *Lips* 1-7. After loading *Splice* onto the icon bar, selecting Splice will enable you to create a sprite file window for you to drop your images into.

Options on frame size are available but beware of memory restrictions on a 1Mb machine. Load the sprites into the sprite file window and, hey presto, they will be displayed and then they can be saved as a single film format file.

Projector is supplied with *Splice* to play the film. After installing *Projector* onto the icon bar, Select on the film to view. The film can be played in desktop or whole screen mode.There is a key option to control the frames per second plus freeze, yo-yo and reverse choices.

FINAL CUTS

At 2.45pm on day two of our film shoot, we sat down for a grand finale of screenings. The quality, originality and breadth of work that had been produced by the Sandwell pupils was astonishing.

Twenty-four films had been made, representing 5,759 kilobytes of material. In addition, two VHS tapes were produced, containing three hours of documentation showing the making of the films, and there were five folders full of design proposals, drawings and the pupils' diaries.

My two favouite films integrated smooth animation with a humorous storyline. *Mole* by Roger, Year 7, from Heathfields High School, describes the underground journey of young moles to the surface upon which they surprisingly sprout purple wings and fly away. Roger used *Revelation 2* and *Splice* for this. *Mole* is 14 frames long and 257K in size. I think the idea, taken further, would make a great computer game.

Fido, by Marie and Alison, Year 8, from Willingsworth High School, relies on small subtle changes (using just the eye and head) to effectively convey a feeling of movement.

Reactions to the project ranged from 'superbrilliant', by one pupil, to requests for more support material for this type of work in the classroom from a teacher.

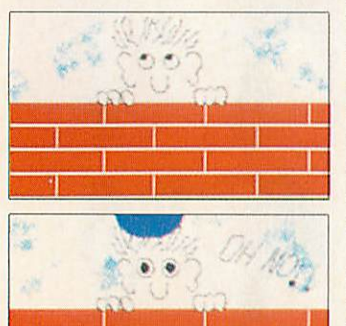
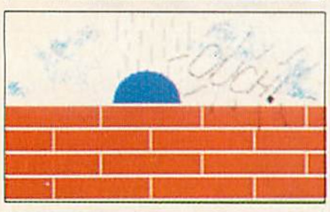
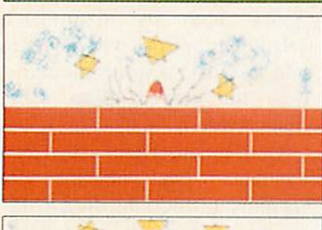
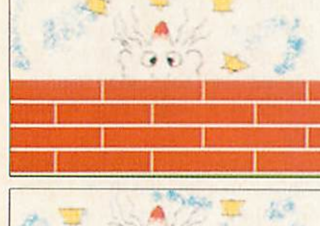
Towards the end of the project, two pupils asked for music software for soundtracking to complement their films, which revealed that they were thinking creatively about designing movies. Unfortunately, on this occasion, I did not have enough time to explore this avenue.

The pupils' diaries also revealed a confident use of a new vocabulary based on their experiences such as 'frames', 'editing', 'sequences' and 'timing'. In National Curriculum terms, the IT skills ranged from Communicating Information to Modelling, particularly where the editing and timing of films were involved.

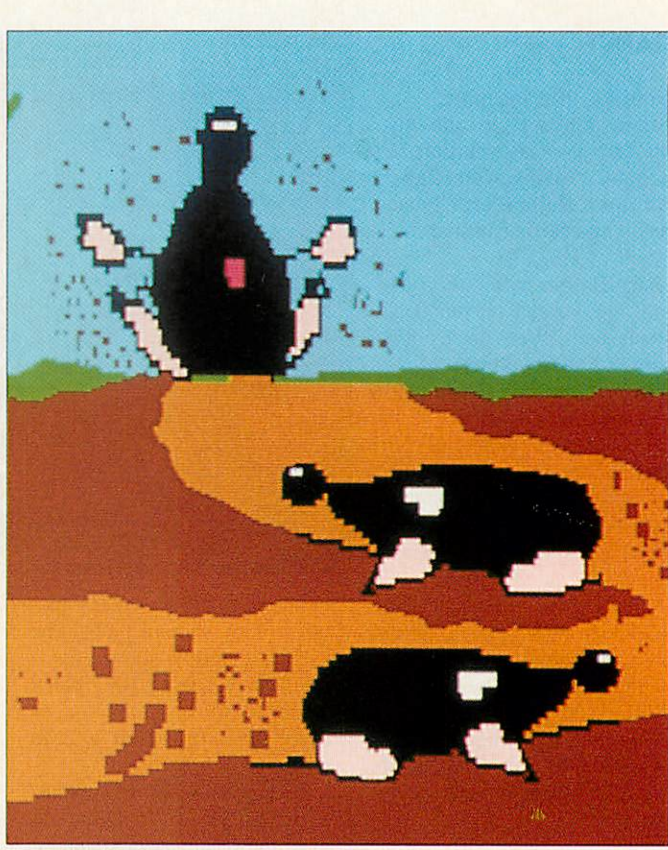
It is also important to emphasise that it was the first time these schools had attempted this sort of work, although by the end of the project their new skills would be shared and developed back in their schools.

As a postscript to the event I would like to to repeat the project with primary age children on a larger scale and taking a bit more time.

In the meanwhile, as we look at Acorn's sophisticated Replay showing impressive demonstrations of movies, it seems strange that there is such a gulf between the home-made and the corporate. Both can liberate enormous creativity and, perhaps, a greater emphasis on good honest examples of the younger generation's work could power computer video making forward to the future.


Fido uses eye and head movement



Roger's moles showed a surprising versatility

HINTS AND TIPS FOR ANIMATORS

- Keep it simple to begin with, such as a flower opening, a chimney smoking, changing facial expressions.
- Screening of films is a good way as an introduction to break the ice using the public domain software *Projector* and can provide the stimulus for design drawings.
- It's a good idea to use a 2Mb machine as collections of sprite files take up a lot of space.
- Organisation in a school situation might involve creating a film company and defining different roles such as director, designers, camera operators and scriptwriters. A lot of cross-curricular work is possible.
- Experiment with different software – for example, *Draw*-based *Font FX*. used with *Tween* and *Draw*, will produce moving graphics.
- If you use a digitiser and video camera try simple film experiments such as saving the stages in the construction of a sculpture, a science experiment, or a dance routine.
- Form an animation club. Users of *Euclid 3D* drawing software by Ace Computing formed a user group called 'Elements', now in its second year that provides a quarterly disc. Elements is run by Richard Molyneux, 42 Keswick, Gt. Buckham, Leatherhead, Surrey
- Your animation could be included in a multimedia presentation using *Magpie* (Longman Logotron) or *Genesis 2* (Oak Solutions)
- Don't assume it's difficult; the speed of Acorn computers combined with software compatibility make animation rewarding and creative.

PRODUCT DETAILS

Product: Pineapple colour digitiser
Supplier: Pineapple Software
Tel: 081-599 1476
Price: A300/400/500 – £199
A3000 – £235

Product: Revelation 2
Supplier: Longman Logotron
Tel: (0223) 425558
Price: £95

Product: Iota Image colour scanner plus Image Animator software
Supplier: Iota Software
Tel: (0223) 421542
Price: £739 (software: £69)

Products: Tween & Splice
Supplier: Ace Computing
Tel: (0223) 322559
Price: £34 each

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* Alter memory between processor instructions
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PROGRAMS

The section that is packed full of exclusive programs for you to use

Asteroids, spaceships and masks. No it's not the spaceman's ball, it's the second part of our introduction to the techniques used in writing games.

This month our illustrious and industrious games expert, Antony Bruce Lytis, takes the reins and explains how to whack sprites on to the screen at a speed that will make your eyes water. A sprite – for the uneducated – is what makes a game what it is, it's the bit the player sees. Get enough good-looking sprites on the screen and you're off to a good start. Dave shows how to navigate around the slow operating system calls to get the speed you need.

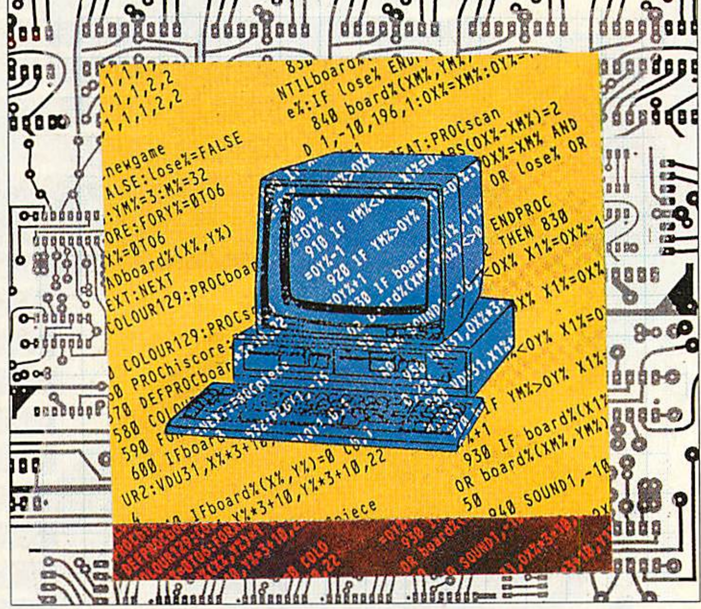
Of course sprites have to move across backgrounds, and masks play an important role here. Dave shows you how to move your asteroids over a screen of stars; if you can do this with stars you can do it with anything.

Industrious Dave also appears on page 79 this month, with another Acton and James collaboration (I had the idea, he did the hard stuff).

BIO is potentially the most useful bit of software ever published, simply because it is the most open-ended. Put simply, basically would be another word for it, *BIO* is an input-output processor with added B, B for brilliant that is.

BIO will accept files from filing systems or other programs. Then the file is passed to your own specially written parasite routine. This can process the file in any way it wants, and then use the other half of *BIO* to output the results, either on the desktop or as another file.

Of course we have supplied two routines for you to get started which serve as examples and which are incredibly useful. One, the *SumMean* module, takes a text file dragged to the icon bar as an input, and then shows the sum and the mean of all the numbers in that file in a pop-up window. Great for adding up lists of numbers, because you can always go back and edit them later, unlike a calculator.



CONTENTS

The whole beauty of the *BIO* application is that adding a new module, or amending an existing one, is easy. It's easy to latch onto the main application, which provides all of the desktop input and output routines you'll need; you just concentrate on the bit that does the work of providing the output that you need.

Another module supplied this month is the extract sprites from *Draw* files module, *DrawSpr* for short. This will take a *Draw* file as input, extract all the sprites and send them to *Paint*.

If you write a *BIO* routine then send it into *BAU*. The best and most useful will be published; the usual cash prize and intergalactic fame is attached. Turn to page 73 and find out how *BIO* can improve your life.

*INFO continues its chaotic trip through the nether halls of any subject under the sun on page 83. Look out for the second of our challenges on page 87. The last one was a great success, and we expect this to provoke the same response.

An excellent printer utility for 32-bit owners helps you control those uncontrollable codes; eight-bit owners are given a dose of sinusoidal text and the Daves explain how to show people that your lovely hand-crafted piece of machine code is actually doing something vaguely useful.

It's all topped up with a healthy helping of one-liners that rest like little hundreds of thousands upon the juicy trifle that is *INFO.

Arm programming is on page 97, followed by the grand finale of this month's programming section, the yellow pages, on page 101.

Paul James



OF SPRITES AND MEN

Last issue he gave you the background; this month Antony Bruce Lytis expounds on the plot

Just about every game requires sprites; those bits of your graphics that move about. They come in all shapes and sizes and there are just as many ways of displaying them. In this article we look in detail at how you get your animated design – be it rocket, dragon, caveman or ice-cream – onto the screen as smoothly and quickly as possible.

DESIGN NOTES

There was a time when any self-respecting magazine game would be accompanied by its own sprite designer. With the advent of 32-bit technology and *Paint* – the free sprite editor that comes with your Arc – there is little point in providing an alternative. *Paint* is a perfectly good graphics editor:

- You can create sprites in any mode and view several side-by-side, magnified if preferable.
- *Paint* provides a means of copying them so you can easily produce animated sequences.
- *Paint* also features many other tools that are useful for sprite creation.

Of course, if you prefer to use another art package for part, or all, of your sprite designing, you can generally save the result as a sprite file.

All the examples this month take as their input a simple sprite file; *Sprites*. The program *MakeSpr* generates this file, but if you would prefer to avoid typing in the data and design your own versions, the table on page 75 contains a list of the sprites you'll need in the *Sprites* file.

BASIC SPRITES

Plotting sprites in Basic employs the same techniques as would be used in a machine-code program. The only difference is that much of the work is done for you. The SYS "OS_SpriteOp" call, which is the most versatile method of manipulating and plotting sprites, is not as fast as a custom-written routine of course. However, simple Basic programs using OS_SpriteOp are not only good demonstrations of the ideas involved, but can also serve as valuable 'mock-ups' of full-blown machine-code games. For these reasons our first two listings are Basic sprite demonstrations; *BasicSpr1* and *BasicSpr2*.

One of the sprites in the demo file is a boulder and *BasicSpr1* provides the simplest of meteor storms. PROCload_sprites checks the size of the *Sprites* file and creates a suitable sprite block into which the file is loaded. This simply involves putting the length of the block in the first word and loading the file after it.

Thereafter, we can use OS_SpriteOp with a pointer to this sprite block to access and display any of the sprites therein. Rather than use the full SWI name, we use SYS sprite_op% where sprite_op% is 46; the actual SWI number. This can greatly speed up Basic sprite demos; the time taken to decode the SWI name can outweigh the time needed for the operation itself.

We also use OS_SpriteOp &18 to find the actual address of the boulder sprite. OS_SpriteOp can accept sprite references either by name (in which case add &100 to the opcode) or by physical address (in which case add &200). The latter is clearly quicker, since any string checking is bound to be time-consuming.



Photo: PETER DAZELEY / Model: TONY JUDGE

PROCinit_rocks simply sets up a few arrays for the meteors. Alter the value of rocks% depending on the speed of your machine. The plotting is done by PROCanimate. This uses two screen banks – one for display and one for update – as all such demos do. The OS_SpriteOp call &22 is use to plot each rock at its given position.

The rocks are then moved left at their respective speeds and when they fall off the left-hand side of the screen they are immediately re-introduced on the right. The routine OS_SpriteOp has saved us a lot of bother and, in particular, has

taken care of two particularly awkward programming points . . .

Clipping: When a rock is totally or partially off the screen it is clipped accordingly. Any routine of our own would need to do this itself so sprites on the right of the screen don't creep round to the left and those off the top and bottom don't cause Address Exception errors.

Shifting: The Arc is very particular about word boundaries. As a general rule, your source sprite will be stored in a word-aligned fashion. That is, each row of graphic data will start at an address in memory which is a multiple of four. This means that word instructions (rather than the much slower byte instructions) can be used to transfer the image to screen.

However, each rock in *BasicSpr1* can appear at any x co-ordinate and therefore the destination screen address need not be word-aligned. Some shifting needs to be done if word instructions can be used to poke the sprite onto the screen and OS_SpriteOp sorts this out for us.

MASKS

In most games, you will need to give your sprites masks, particularly if they are moving against some exotic background scene. Any sprite created with *Paint* can have its own mask. This is effectively another parallel copy of the sprite and takes up the same amount of memory. So, the sprite *Rocket* in the demo file, which is 16 by 16 pixels in mode 13, actually contains 512 bytes of data; 256 for the image itself and another 256 for the mask. Each pixel has a corresponding mask pixel the same number of bits in size (eight for mode 13, four for a 16-colour mode like mode 9, and so on).

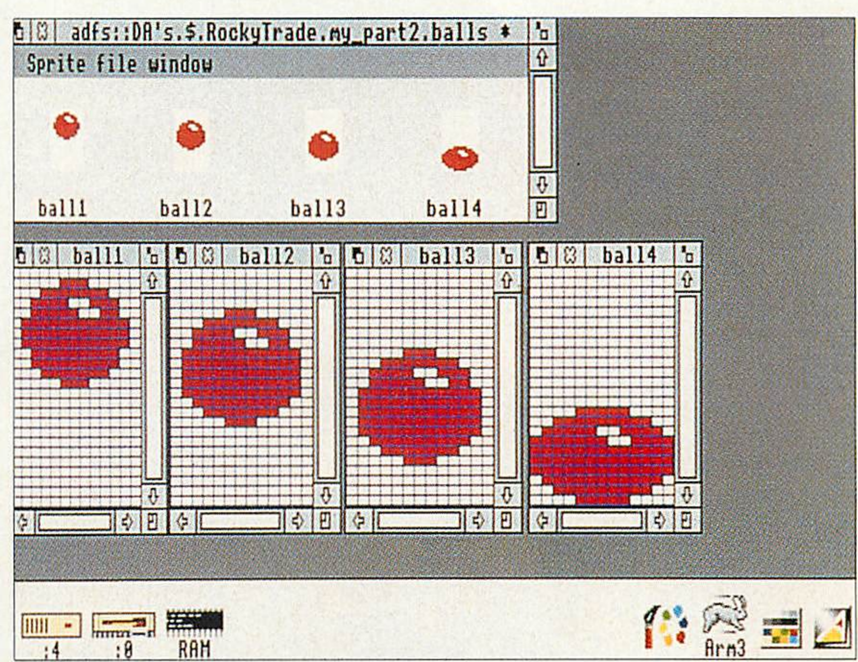
If a pixel's mask is 0 then it is transparent and whatever was on the screen beforehand is left intact. If not, the pixel is plotted and overwrites any previous screen contents. The diagram on this page shows a simple sprite and its mask. In practise masking is achieved using logical operators. If a byte of the screen contains S and the pixel to be plotted is colour P with mask M the screen contents are changed thus:

S=(S AND (NOT M)) OR P

This is quite easy to do in machine-code but OS_SpriteOp can do the work for us. Unlike *BasicSpr1*, which didn't employ masks, the bouncing balls of *BasicSpr2* are plotted using masks against a background of stars to show that it all works properly. If you can get away with not using masks (*BasicSpr1* places rocks carefully so they never overlap) then plotting will be much quicker.

BasicSpr2 loads the sprites as in *BasicSpr1* and sets up some randomly placed balls. Then a background of stars is created. This is grabbed from the screen (using OS_SpriteOp &10) as a sprite in its own sprite area.

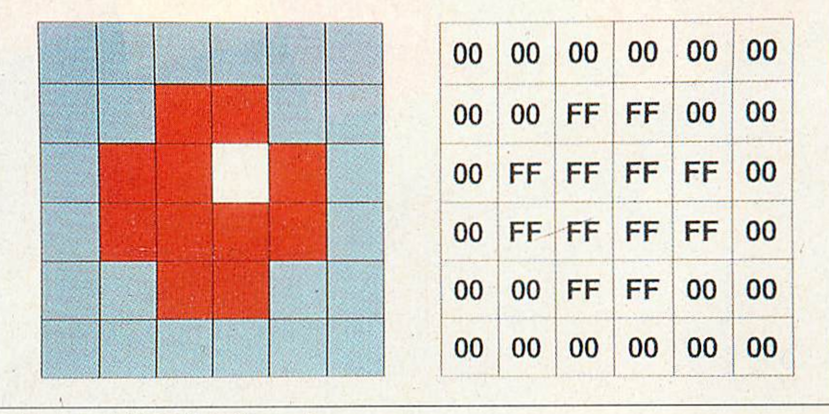
PROCanimate begins each frame by plotting the background sprite and then the balls. The final parameter of OS_SpriteOp &22 is set to eight when displaying a ball. This simply means 'use the mask'. The balls are moved around according to a simple gravitational rule and for extra effect they become 'squashed' at the edges and bottom where they bounce. Two other sprites are used for this purpose. Again, Arm3 owners can adjust their balls% to suit the speed of their machines.



Paint is an ideal sprite designer; and it comes with the machine

SPRITES IN THE DEMO *SPRITES* FILE

SPRITE	MODE	WIDTH	HEIGHT
rocket	13	16	16
rock	13	22	16
ship	13	32	16
ball	9	13	13
ball_sqsh1	9	13	13
ball_sqsh2	9	13	13



A simple mode 13 sprite and its mask

SPRITES IN CODE

Of course, if you're writing a serious game then you will need some serious sprite plotting code. Although it is possible to provide a general-purpose module that supplies sprite-plotting calls for all eventualities, there is no substitute for custom routines.

For one thing, you know what screen mode is in use and can therefore tailor your code to suit it. Also, you may know that many of your sprites are only 16 or so pixels wide and can therefore be plotted very quickly using a custom-written routine that employs multiple load and store instructions. The possibilities are endless, so we recommend you use the examples here to improve your knowledge of how sprite-

plotting works in code, rather than taking them as the be all and end all of sprite plotting.

CodeSpr1 is very stupid and illustrates the simplest and perhaps slowest way of plotting sprites in machine-code. It features just one routine called show_sprite which effectively takes over the role of OS_SpriteOp. The routine takes three parameters – the address of the sprite to plot, and the x and y co-ordinates. These are real co-ordinates, and run from 0-255 down and from 0-319 across the mode 13 screen.

As you will see, much of the first part of show_sprite is concerned with clipping. The fact that part of your sprite may be off the screen is a real pain; particularly annoying if it's just a byte or so. So you can be absolutely sure of how a simple machine-code sprite plot routine works, we have prepared a line-by-line box.

A much better routine is used in *CodeSpr2*. The procedure PROCmake_four is used to generate four copies of the sprites *Rock* and *Ship*. These correspond to the four possible positions within a word of memory. Each copy has its width rounded up to a multiple of four so each row of pixels is a whole number of words big. The masks of the four versions are set up so this word-aligning padding is invisible.

Having four copies of a sprite means that no byte-wise operations are needed at all. All plotting, masking and so on can be done with LDR and STR (or even with the multiple word operations LDM and STM). This has a marked effect on program speed.

The show_sprite routine works much as it did before, clipping the sprite if necessary. However, it begins by selecting which of the four versions to use – R0 now points to a list of four sprites rather than a sprite itself – and thereafter everything is in words.

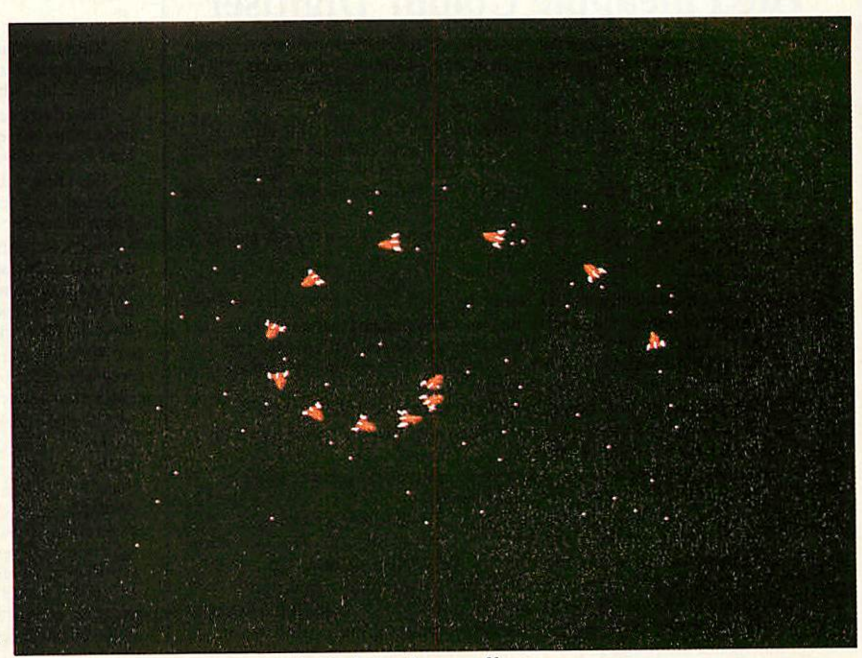
The animation is also in code in *CodeSpr2*. The screen swapping is exactly analogous to the original Basic version. The background is plotted more quickly by fast-copying routine copyback and a couple of calls to the subroutine inkey allow you to move the ship up and down.

SPECIAL EFFECTS

The graphic quality of a game can be greatly enhanced with a few special effects. The Arc is fast enough to manipulate sprites in a variety of ways and *RotSpr* is a demonstration of one of them. It rotates sprites in real-time, and the technique could easily be employed in a game featuring homing bombs or missiles. *RotSpr* plots a series of orbiting rockets.

The sprite to be rotated must be 16×16 pixels in mode 13. Furthermore, the sprite should occupy the central circle within that 16×16 grid. The *rocket* sprite was designed with this in mind. A 16K rotation table is used, consisting of 256 bytes of data for each of 64 possible angles. Each of the 256 bytes indicates where a pixel in the rotated version of the sprite has come from. The mask is also rotated.

The manipulated image is also shifted according to the position of the sprite on the screen. This is again to allow word operations to be used. The workspace at temp is used to store the manipulated sprite which is then transferred to the screen as fast as possible. Multiple load and store instructions make the process even faster.



Sprite rotation can help to provide the best of game effects

CODESPR1 – LINE BY LINE

410 – point r12 to sprite
420-440 – get sprite width in pixels in r10
450-460 – get sprite height in pixels in r11
470-480 – get address of sprite image in r4
490-500 – get address of mask in r5
510 – is the sprite off the top of the screen?
520-570 – if so, adjust the height and move on the image and mask pointers to skip the invisible lines
580-590 – is sprite off bottom?
600-610 – if so, adjust height
620 – r12 is the 'pixels off side' counter and is used to skip any pixels off the right or left
630 – is sprite off left?
640-690 – if so, adjust width, image and mask pointers and add the number of invisible pixels to r12
700-710 – is sprite off right?
720-740 – if so, adjust width and update r12 again
750-760 – if sprite is invisible (no width left) then exit
770 – the row-by-row loop starts here.
770-780 – if we have no rows left to plot, exit
790-820 – calculate screen start address of row to plot and place in r3
830 – set r7 to the number of pixels to plot in the row
840 – the x-wise loop starts here'
840-850 – if the source is not on a word boundary (only true if the sprite is slightly off side) skip to the byte plotting routine
860-870 – if there are four or more bytes left to plot skip to the word plotting routine
880 – the byte plotting routine starts here
880 – get byte from screen
890 – get byte from image
900 – get byte from mask
910 – apply mask to screen
920 – OR image byte with masked screen byte
930 – store the result back on the screen
940-950 – adjust the counter and repeat if needed.
960 – go to next row
970 – the word plotting routine starts here
970-1030 – get word from screen. We assume r3 is not on a word boundary so we build it up byte-by-byte
1040 – get word from image
1050 – get word from mask
1060 – apply mask
1070 – add image
1080-1140 – write the word back to the screen
1150 – adjust the counter
1160 – repeat as necessary
1170 – increment the row number
1180-1190 – skip any bytes off side of screen
1200 – decrement the row counter
1210 – repeat

UNTIDY MASKS

One slight problem with creating sprites using *Paint* is that junk pixels can get left unseen beneath the mask. Whenever you choose the mask colour and overwrite a pixel, that pixel is not changed to black but remains whatever colour it was.

This is not a problem with Basic sprite programs but for machine-code routines like those in *CodeSpr1* and *CodeSpr2* it is vital to remove the mess beneath the mask if plotting is to be as fast as possible. To this end we feature the bonus listing *TidyMask*. Simply give it a sprite file name and it will tidy each sprite in turn so that all masked out pixels are in fact black. The tidied file is resaved with the old name.



A PROGRAM FOR ALL SEASONS

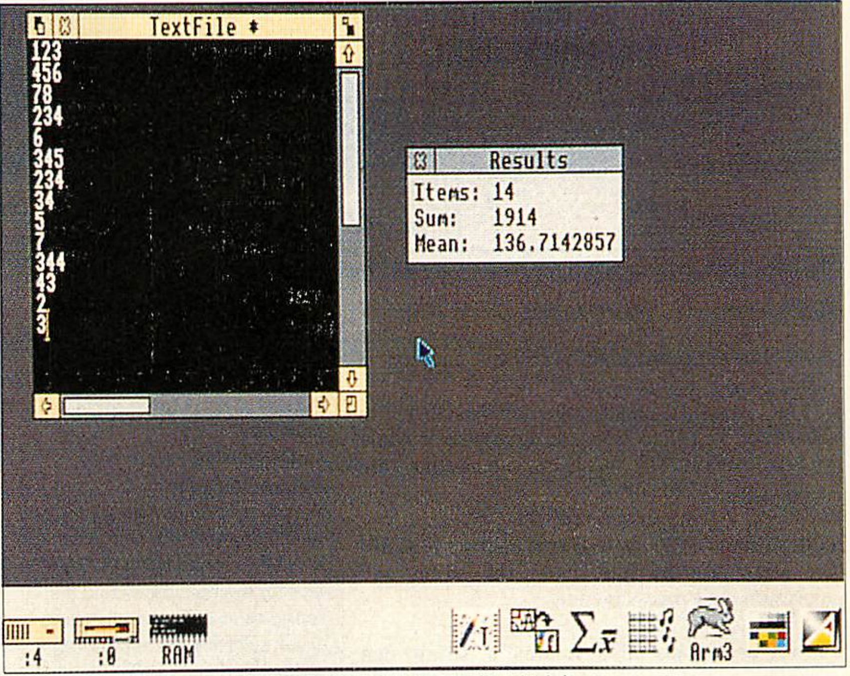
Dave Acton introduces BIO, the flexible answer to all file problems

We're not quite sure where the idea for this application came from exactly. Maybe it just evolved by itself in some dark, damp corner of the *Acorn User* office. All we know is that it turned out to be a very good idea indeed and we hope you will think so too.

What was needed, it was thought, was some universal file-processing application to which 'modules' could easily be added to perform useful functions. In this way any user with only a modicum of Basic programming ability could write a desktop utility.

The result was *BIO*. The I and O stand for Input and Output – a file is taken in, processed using the module of your choice and the result is spat out again. We added the B because *BIO* sounds nice and organic and we hope the application will grow and grow as we – and you – come up with new ideas and modules to add to the system.

This month we will go over the basics of *BIO* – how to enter and use it – plus we provide three sample modules to get you going. Next month in *Acorn User*, there will be a trio of more advanced utilities for you to plug into your ever-growing system.



MeanSum is a simple module that illustrates how BIO does its job

GETTING STARTED

The first thing to do is to create a directory called *!BIO*. This can be placed anywhere you like. Enter the main program *!RunImage* and save this inside *!BIO*. Now enter and run the program *Dat_Bio* inside *!BIO* to create various other files. A subdirectory *!BIO.Library* will also be created. It is in this directory that all the *BIO* modules live.

Having entered the main program you will also need to enter a sample module to try it out. Use one of the two example modules *DrawSpr* or *SumMean*; and within the article there are two boxes describing how to enter and use them.

Double-click on the *BIO* icon to install. You will see one or more icons appear on the icon bar. Each module has its own icon and when the module is enabled that icon will appear on the icon bar.

Use the Menu button over any of the icons to bring up the *BIO* menu. The Process option will give you a list of the modules. Any modules that are available are marked with a tick and will be on the icon bar. To select or deselect a module, click with Select or Adjust. If no modules are selected you will just see the *BIO* icon. Set Default saves the current selection of modules as a file called *!Choices*. When you next install *BIO* these modules will be available. Quit kills off the particular module. If you go off to the submenu and click on All, then *BIO* will be killed and all the icons will disappear from the screen.

SUM AND MEAN

Module: SumMean
Purpose: Simple statistics
Input: Text file containing a list of numbers
Output: Total, number of items and mean

This simple module shows how results can be produced from a single input text file and displayed on the screen in a results window. To use the module, create a sub-directory in *!BIO.Library* called *MeanSum*. Then enter the Basic program *MeanSum* and save inside the new sub-directory. Finally, go into the sub-directory and enter and run the program *Dat_sum*. This will create the sprite file for *MeanSum*.

To try it out, ensure the module is selected from the process menu. Create a small text file in *Edit* containing a few numbers, each on a separate line. Now save or drag onto the *MeanSum* icon. The results will be shown.

USING BIO

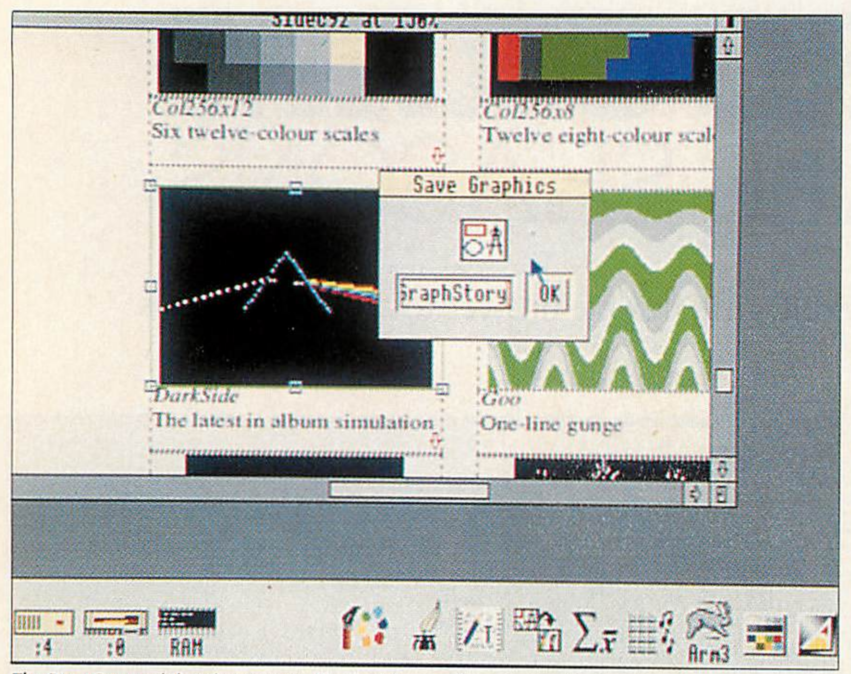
How you use any particular *BIO* module depends very much on the module itself. Most modules take files as their input.

When a module has finished processing a file the outcome will also vary. The *SumMean* example takes a text file as input and outputs three values that are displayed in a small window. Other modules may output files, for example *DrawSpr* which accepts a *Draw* file as input and spits out a sprite file. What a given module expects in and puts out is defined by a function within the module itself.

WHAT IS A BIO MODULE?

A simple *BIO* module consists of two files. One is a piece of Basic consisting of various functions. The other is a sprite file that contains an icon which, hopefully, represents the purpose of the module.

Writing a *BIO* module is a very simple procedure. Have a look at one of the examples in this feature – *DrawSpr* for instance – to get the



The DrawSpr module takes a sprite file (in this case, from Impression) . . .

general idea. At the very least, your piece of Basic will need to contain four module functions. Let's assume that your new module is called *Test*.

You should create a sub-directory in *!BIO.Library* called *Test* and save your module as *Test* inside it. The functions to be defined are as follows:

FNtest_name This just returns a string describing what your module does. The string will appear on the Process menu.

FNtest_args This also returns a string that contains a definition of what your module expects as input and also what it will produce as output. It may contain the following valid options:

-*in* <*filetype*> This specifies what sort of files your module expects to be given (text, sprite or whatever). Any files of the given type that are dragged onto your module's icon will be processed. You can use -in * as a 'wild card' to mean 'any filetype'.

-*out* <*filetype*> If your module outputs a file this specifies the type. A Save box will appear when the processing is done and the icon therein will be appropriate.

-*results* <*n*> Your module may alternatively output one or more result strings. These are passed back to the main program and displayed in a small window. The *SumMean* example does this.

-*directory* Some modules may like to be passed directories and this option permits it. Next month we will be featuring a utility which can merge all the sprite files in a directory.

-*send* If this option is present, any file produced by your module will be sent to an appropriate application if present. The *DrawSpr* module uses this and if *Paint* is loaded the sprite file produced is sent directly to it. If not, a Save box is provided.

FNtest_init This function will be called once when *BIO* is installed. Any arrays etc that will be needed by your module should be defined here. Note that any variables or arrays you define should be given unique names to avoid clashing with other modules. Prefix them with the module name – test_var1, test_var2$ etc

FNtest And finally the module itself. This is the function that processes the file. It is called whenever a file of the right type is dropped on the corresponding icon. The parameters passed to it depend on the string that was returned by FNtest_args. The three examples show the complete range of possibilities.

If your module takes an input file but produces no output the main function will only take one parameter; the input filename itself.

If your module takes an input file and outputs one or more results (like *SumMean*) then the main function will take (2+results) parameters. The first is the input filename, the second is the title to be used for the results window and the others are the results themselves. They are all RETURN parameters; that is, they are filled in by your main module function and returned to *BIO* for display.

The last possibility is that your module will take in a file and output another one (as *DrawSpr* does). In this case, the first parameter for the module is the input file and the second parameter is the name of a junk file which is to be used as the output file.

The best way to try your hand at writing a *BIO* module is to study the two examples here and to base your own on one of them. For example, try writing a simple word-counter based on the *MeanSum* module. Take a text file as input and output a single string containing 'x words counted'.

HOW BIO WORKS

We have kept *BIO* deliberately simple so that it is not too long for people to type in or comprehend. On the Arc, so many of the applications we see are vast and complex systems, but *BIO* remains is designed to be immensely versatile despite its small size.

The modules are found by scanning the *Library* subdirectory. Any Basic programs found in there are noted as modules and added to the list. Currently there is a maximum of 32. Any sprite files encountered will be added to a pool of sprites.

Each module should have at least one sprite defined for it with the name xxx4 where *xxx* is the name of the Basic module file. This sprite should be in mode 12 and 34×17 pixels in size (these are standard icon bar dimensions). You can also define a high-res sprite xxx2 which will be used if you have a high-resolution monitor. This should be 34 pixels square in mode 20.

Although you will find it convenient to save the code and sprites for a module in a sub-directory of the same name, the files can in fact appear anywhere within *Library*. In addition,

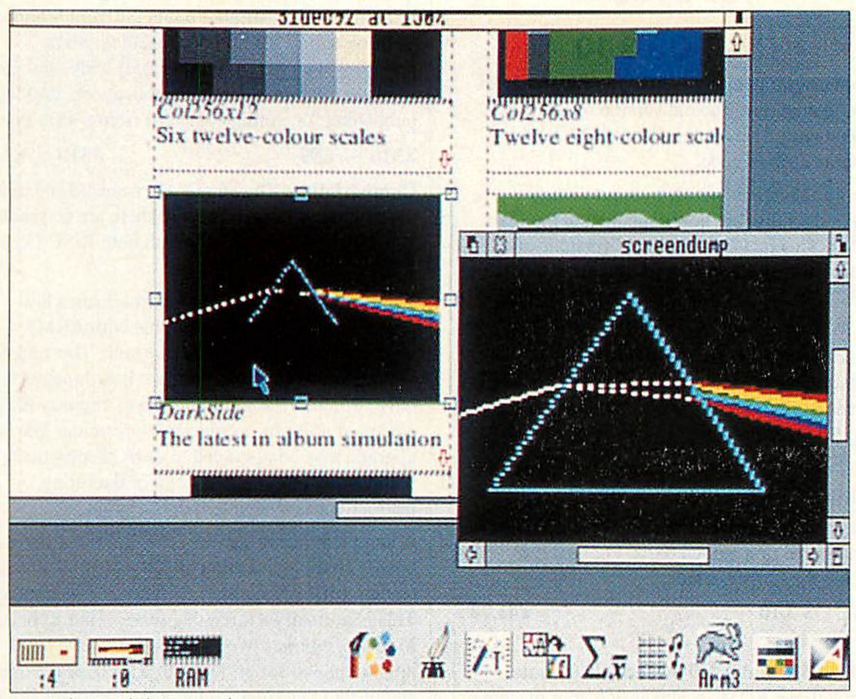
DRAWFILE SPRITES

Module: DrawSpr
Purpose: Extract sprites from drawfiles
Input: Drawfile
Output: Sprite file

Drawfiles often contain sprites; any sprites dropped into *Impression* can only be exported again as *Draw* files for example. Extracting the sprites usually requires installing *Draw*, selecting the appropriate sprite object and saving it again. This module simplifies the task.

To use, create a subdirectory in *!BIO.Library* called *DrawSpr*, enter the Basic program *DrawSpr* and save it inside the new sub-directory. Finally, go into the sub-directory, enter and run *Dat_drsp*.

Simply drag your drawfile onto the *DrawSpr* icon and a save box will soon appear. Save the sprites in the usual way. If *Paint* or another sprite editor is present the sprites will automatically be sent to it.



. . . and turns it into a sprite

you can create a template file for a module that will allow you to have a simple set-up window attached to it. We will explain more about this next month.

Once all the sprites and modules have been accounted for, the OVERLAY command is used to attach all the Basic module files to the main program as libraries.

OVERLAY takes a string array as a parameter and allows all the functions and procedures in the files named in the array to be accessed. The files are loaded as, and when, they are needed and the only proviso is that functions from one module cannot call those from another; they might be overlaid and therefore they cannot be loaded simultaneously. You can, however, make use of various functions and procedures provided within the main *BIO* program. These have been included to make life easier. Here is a list of some of the most useful ones;

FNuc(str$) takes a string and converts it to upper case

FNlc(str$) converts a string to lower case

FNstrip_spaces(str$) strips off any leading or trailing spaces

PROCbput(f,str$) writes a string str$ to an open file with handle f, terminating it with a linefeed (Ascii 10)

PROCwput(f,word) writes a word (4 byte) value to a file

FNwget(f) gets a word value from a file
FNget_str(a) gets a zero-terminated string from memory at address a

FNfile_type(type$) converts a file type (for example, 'text') into the corresponding number
FNleaf_name(f$) returns the leaf name of a file (the bit after the last '.')

MONTHLY DISC

The monthly disc contains *BIO*, plus the example modules – *SumMean* and *DrawSpr* – featured this month. Also included are high-resolution versions of all the sprites for multi-sync monitors.

PROChourglass(a,b) shows the hourglass with percentage (a/b)*100

Of course, you might like to add your own functions and procedures to *!RunImage* so that they can be used by *BIO* modules.

The main loop in *!RunImage* begins with a SYS "Wimp_Poll" like all applications. This returns a reason code and a set of parameters describing what the user has done (if anything). When a file gets dragged onto one of the *BIO* icons a message is passed to the application. This is in turn passed to PROCmessage which decodes it.

Message type three means 'file dropped on icon' (it is actually a DataLoad message). FNwhich_proc is used to find out which icon it was and then a check is made to see if the input file is of a type appropriate to the chosen module. If so, PROCprocess is called, which will in turn call the appropriate routine in the module itself. Then a message will be sent back saying that the program has duly dealt with the file that was supplied.

Files may also be saved directly from other applications onto a *BIO* icon. In this case, a different message – number one or DataSave – is passed to PROCmessage. Again, the program checks the filetype. If all is well it tells the application to save the file in a temporary file called *Wimp$Scrap*.

It does this and then sends a message three to the user (as above), so we proceed to process the file as before. More messages are used when saving output files or transferring them to applications. Next month's feature on *BIO* will provide more details.

ANY IDEAS?

Just about anything can be made into a *BIO* module. All the desktop/wimp side of things is dealt with for you; the only job remaining is for you to write the code itself.

Three more invaluable *BIO*-based utilities will follow in next month's *BAU*. I will also be offering more advice on how to write your own *BIO* utilities. Meanwhile, here are a few ideas; we'll be featuring some of them over the coming months.

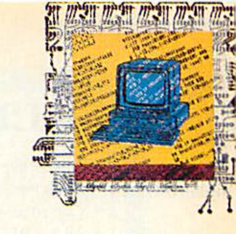
File utilities: These could be used to unlock or lock directories, wipe directories, find the ten biggest files and so on.

Conversions: For example, you could convert graphic and sound files into different formats.

Text processing: Modules could be designed to format or tidy text files, prettify Basic and C programs, do label printing, and more.

Programming tools: Search files for strings, dump files straight into an *Edit* window . . .

Of course, we would also like to see any ideas and modules that you can come up with. The best ones will be published in the magazine and will earn their creators a small quantity of ready cash plus, of course, the usual large quantity of admiration from their fellow *BBC Acorn User* readers.



*INFO

Dave Lawrence and Dave Acton present their monthly mix of programs, for all Acorn users

STAR PROGRAM!

GOOD VIBES

Programs: Stars, SpiralTree
Description: Graphic demos
Author: Jan Vibe
Machine: 32-bit
Listings: 120, 140, 120 lines Basic

This pair of excellent graphical offerings comes from regular Jan Vibe, who uses a wide variety of cunning devices to achieve the effects.

Stars fills the screen with randomly drawn stars that are 'twinkled' by cycling the palette. Having filled the screen, the program waits a little while before starting a fresh one.

First a random black pixel is chosen. If one cannot be found the screen is cleared. Then p%, the number of points of the random star is chosen. The star is actually plotted using the *Draw* module. This module comes as a part of Risc OS and is used by *Draw* and many other applications and programs.

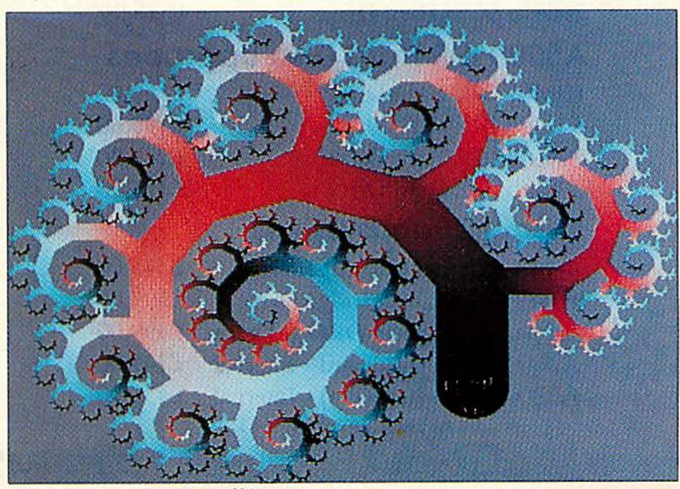


The crazy world of Jan Vibe: this month he's seeing stars . . .

A draw 'path' is built up at path%, and this is passed to Draw_Fill, which does the business. A number of small procedures are used to add elements to the path; PROCm adds a move, PROCd a draw, PROCcl closes the path and PROCe ends it. SYS "Draw_Fill" simply takes the list of moves and draws and plots it. The other three parameters it takes determine the fill style, transformation matrix and flatness and are set to 0 for sensible default values. Each star is in fact made of several concentric stars plotted in sequential colours.

The palette is continuously cycled by PROCf. *Stars* runs in mode 12 and the array c%() holds the red, green and blue components of each of the 16 available colours. Not only are the 16 colours cycled round but occasionally a single component (R, G or B) of the colours are cycled independently; altering the colours subtly and smoothly.

SpiralTree plots a tree in a fairly conventional recursive manner. The difference is that each segment of the tree is plotted using a clever dithering technique. As the tree bends around, the colours used to



. . . but at least he's not off his tree

plot it are cycled, and each segment is plotted so it runs smoothly from one colour to the next. As with *Stars* the colours are continually cycled and on occasion, subtly changed.

The dithering technique makes use of the so-called giant ECF (extended colour fill) pattern. The DATA statements at the end of the program define a series of dot patterns of continuing darkness. To plot a segment of the tree, it is first split up into small pieces.

For each, a giant ECF pattern is defined that depends upon how far the portion of the line is from each end. Then GCOL 80 is used to select the ECF pattern for colouring and a circle is plotted. Each segment is made up simply of a line of such circles, each with a slightly different dot pattern to the last.

SHADY BUSINESS

Programs: Shade1, Shade2
Description: 3D image renderer
Author: P D McKenzie
Machine: Eight-bit
Listings: 125, 140 lines Basic

This is not exactly a ray-tracer, but it does produce excellent 3D shaded images. So that the program fits comfortably on an eight-bit machine it is divided into two parts.

Shade1 reads the definitions of the objects to be rendered from the DATA statements at the end. These details, together with other calculated angles, and other values are saved in a temporary file *temp*. A wire-frame model of the image is plotted before *Shade2* is CHAINed.

This program reads the information from *temp* and then provides you with a box to define the area of the screen that will be rendered. Move it with Z, X, : and / or resize it with the cursor keys.

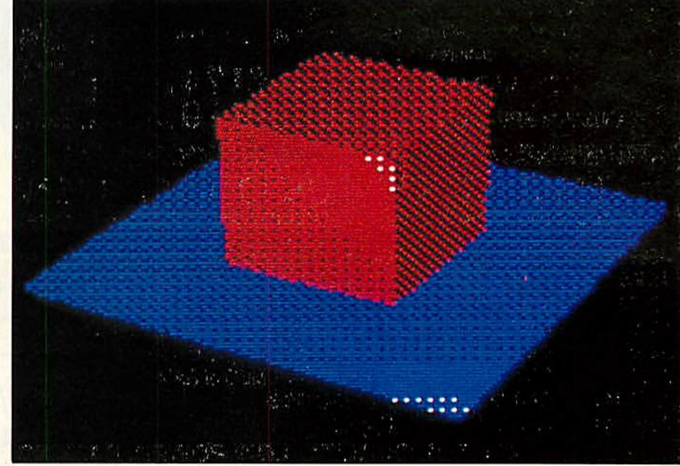
When ready, press RETURN to start. The rendering process can be halted by pressing B. Define a new box and try again. In this way you can try out a small portion of the image before going the whole hog (which may take some time on a Beeb).

The objects in the picture are made up entirely of triangles. Each DATA line defines one such triangle and consists of three pairs of three-dimensional co-ordinates and a colour. The image Mr McKenzie has provided is a red box on a blue base.

For the sake of simplicity and speed, he has only defined the sides of the box that are visible. The program would correctly hide those sides invisible to the viewer, but would take longer to finish the rendering.

Shade2 works by scanning the area to be plotted pixel by pixel. Using values calculated by *Shade1* it finds which of the triangles lie over each point. If none do, a black dot is plotted. Otherwise the one nearest to the viewer is found and the dot is coloured according to a simple shading algorithm.

Altering the values of ax, ay and az in *Shade1* will rotate the objects accordingly. Alter their scale by changing mm to a value other than one.


Boxing clever: Shade is the fast alternative to ray-tracing

You can save the screen by pressing S. 32-bit owners can easily convert the program to run on their machines. The only procedure that needs changing is PROCsave in *Shade2*. Just replace the OSCLI statement with a suitable *ScreenSave command.

As it stands, the program will work on all eight-bit machines without resetting PAGE, although Mr McKenzie says you may have to lower PAGE if you are trying to render a particularly detailed image. Shadow memory and second processors can of course be used since both programs are in Basic and thoroughly 'legal'.

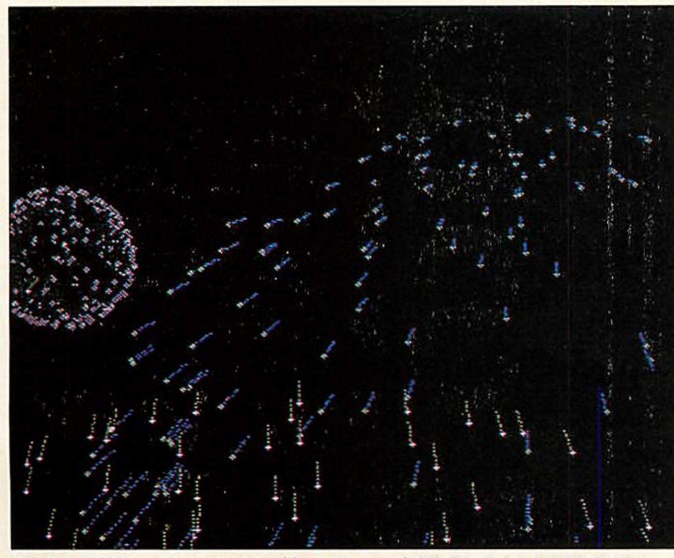
BANG!

Program: Bang!
Description: Fireworks display
Author: David Llewellyn-Jones
Machine: 32-bit
Listing: 255 lines machine-code

Despite its name, this latest offering from David is surprisingly silent. The graphic effects are rather impressive though and although it's a bit late for bonfire night, we couldn't resist including it now.

The program first assembles the code required to plot the fireworks. David has 'unravelled' a loop or two; macros are used to repeatedly assemble similar bits of code so that a loop (and a time-consuming branch) is not required. This means that the code runs nice and quickly even on an Arm2 machine. Indeed, the author recommends that Arm3 users turn their caches off to see the display at its finest.

Each firework consists of an expanding ball of stars. These are themselves made up of a number of points which form the trail. The head of each star is coloured differently from its trail for best effect. A very simple check is used to ensure that points are not plotted off the screen.


Oooh, aaah! Bang is unseasonal but spectacular

BITS AND PIECES

● A handy hint from the listing of *BIO* (see pages 79-81). If you have a number of flags which you wish to combine into a bit field, you may use something like:

```
IF a m=m OR 1<<1
IF b m=m OR 1<<2
IF c m=m OR 1<<4
```

and so on. You might even try:

```
m=m OR SGNABSa<<1
  OR SGNABSb<<2
  OR SGNABSc<<4
```

which does, at least, reduce it to one line. But, because a TRUE value is represented by -1, it therefore has all its bit set and the bit field can be generated by ANDing out the appropriate one and ORing into the field;

```
m=m OR (a AND 1)
  OR (b AND 2)
  OR (c AND 4).
```

● RISC OS 3.1 cheat mode bug! We covered the author list 'cheat mode' in last month, but Paul Callan from Dublin has pointed out in interesting feature. Instead of clicking on the T of computers, he clicked on the T of Author. Try and it and see, but *please* save what you're doing first.

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EPSON HELP

Program: EpsonCodes
Description: Printer utility
Author: Simon Weaver
Machine: 32-bit
Listing: 65 lines Basic

This is a very short and neat utility for getting the most out of your Epson compatible printer without having to look up long sequences of VDU codes. Simon describes his program:

'*EpsonCodes* uses a technique of setting the system variable Alias$command to a list of Ascii values to be sent to the printer. It is very easy to add new codes for personal preference and to delete those not required.

'Each printer command is defined by one DATA line and you must just ensure the program ends with the line DATA END. Check in your manual for commands specific to your printer. The new commands are just like standard OSCLI commands and can be used from BASIC, the * prompt, New Task from the Task Manager and anywhere else where * commands are permitted.

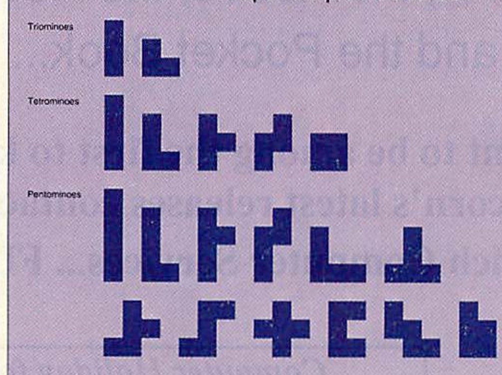
'It may be especially useful when used in conjunction with *FILER_OpenDir printer: to print a file from *Edit* etc. Be warned though, if you use the *SHOW command a lot and have too many options installed then the screen will be filled with a load of confusing numbers.

'The program presently contains over 30 commands, which I myself use most. Some to note are *RESET, which makes the printer beep twice if it is reset properly (if not you must ensure it is online and possibly turn it off and on again), *HALFSPEED & *FULLSPEED, which alter the speed, precision and noise level – only applicable for draft mode and fast graphics printing – *PRBEEP which creates a single beep, *PAPERSENSOROFF and *PAPERSENSOR which turn the paper out sensor on and off, and *SMALLEST which gives the smallest possible size available; I think!. The nine NLQ fonts each have an associated command, but you must first use the *NLQ command.

'The program is not much use for DTP enthusiasts, but

GET IN SHAPE

Following on from the huge success of our maze challenge in September, we present another test for your programming skills. The problem this month is based on a suggestion by M J Whitman of Wells who entered the maze challenge, but was not a prize winner. To make up for this, we're going to send him £25 for this idea. The competition prize is also £25.



Anyway, on with the challenge. Given two squares, there is only one unique way you can join them together (and you'll end up with a domino). If you have three squares you can make two shapes; a line of three or a small 'L'. With four squares you get five shapes and five squares you get 12. These larger shapes are called triominoes, tetrominoes and pentominoes. The figure above shows the shapes you can make. Now imagine a board made up of squares and an infinite supply of -ominoes. How many pieces can you fit onto the board?

The challenge is made slightly harder as the board can vary in size – although it will always be rectangular – may contain immovable objects and, once a piece is placed, you cannot move it. To give you a little more detail, the board will never be smaller than 7xx7 or larger than 15xx15. There is a 50 percent chance that up to 10 percent of the available squares will be occupied by immovable blocks.

The program *Ominoes* forms the core of the challenge. It creates random boards and random pieces and, after a given number of boards, the total number of pieces fitted onto all the boards is displayed. You must provide a set of routines that can be appended to *Ominoes* that fit pieces onto the given boards. We have provided two example sets of routines. *Random* is incredibly stupid; *Exhaust* is pretty stupid.

RULES

1) You must supply three Basic procedures and functions:

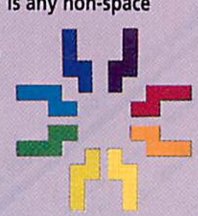
PROCuser_init: This is called once at the start of the program and so should be used for DIMming any arrays you might need and so on. The global variables maxx% and maxy% contain the maximum dimensions of the pieces available (see below)

PROCuser_newboard(b$): This is called after a new board has been created. The global variables width% and height% contain the width and height of the board. One parameter is passed to the procedure. This is a description of the board in string format. Empty squares are represented by spaces (Ascii 32) and blocks by Ascii 255. The first width% characters describe the top line of the board, the second width% characters the next line and so on. The length of the string will therefore by width%*height%.

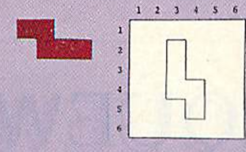
FNfit(shape$): This is called for every randomly picked piece. One parameter is passed to the function. This is a description of the piece to be fitted. The first two characters of the string will be numbers and represent the width and height of the piece given. widest% is the width of the widest piece and tallest% is the height of the highest. The rest of the string contains a definition of the piece. This is in a row-by-row format as per the board definition, empty squares are represented by spaces (Ascii 32) and sections of the piece by non-space characters. The piece on the left would be passed as 42 xx . . . xxx, where '.' is a space and 'x' is any non-space character.



There are eight possible orientations for many pieces (right) and a piece may passed in any one of these. The function should return a string that describes where you would like the piece placed and its orientation.



This should be of the form 'xpos , ypos , rotation'. xpos and ypos give the co-ordinates of where you would like the top left hand corner of the given piece to be placed. rotation should be between 0 and 3 and says how many 90° anti-clockwise rotations should be applied to the piece. In addition, the piece may be flipped about the x-axis by making ypos negative and/or the y-axis by making xpos negative. The piece will be placed first, then any rotation will be performed and finally the piece will be flipped if necessary (right). If you cannot place the piece you should return an empty string "".



2) Apart from width%, height%, widest% and tallest%, you are not allowed to use any variables from the main program. You are also not allowed to make use of any of its functions and procedures.

3) You may not alter *Ominoes* in any way.

4) All solutions will be tested on A5000s (for speed), but you may of course, submit Basic 2 routines. No machine code is allowed.

5) Your solution will be disqualified if any errors occur at run time or it takes more than five minutes on any given board.

6) All entries will be run over 20 boards. The top 50% will be run over 50 boards and the top 50 percent of those will be run over 100 boards. The winner will be the solution that fits the most number of pieces onto those 100 boards. In the event of a tie, the quickest solution shall be the winner. If there is still a tie, the winner will be picked from a hat.

7) The three seed values for judging have already been randomly chosen and sealed in an envelope; no one has seen them.

8) To add a little zest, a small number of other sized dominoes have been randomly chosen and sealed in the same envelope. The descriptions of these pieces will be added to the DATA statements at the end of *Ominoes* for the final judging.

9) Entries will only be accepted on disc. Enclose an SAE if you would like your disc back.

10) All entries will be kept in the strictest of confidence. Employees of *BAU* are not allowed to enter.

11) The closing date is Friday 5 March 1993. The winner will be published in the May 1993 issue.

News Flash

Archive Magazine was first to publish full technical details of the A5000, the A4, the A3010, the A3020, the A4000 and the Pocket Book...

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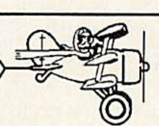


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PSYCHEDELICACIDTRIP

Program: Kaleid
Description: Graphic demo
Author: DL
Machine: 32-bit
Listings: 200 lines Basic and Arm code

Have you ever *needed* a swirling mass of multi-coloured dots slowly rotating in ever-changing patterns of light and dark, forever moving, never stopping, spinning and rotating, pulsing and fading? I know I have! But then it's very dark in my bouncy room and these buckles down the back of my jacket do rub so terribly.

There's not much to say about *Kaleid* – so don't just sit there, type it in and run it, I think you'll be impressed. ESCAPE will generate a new pattern. SHIFT-ESC will quit the program. If you want a change, try altering the value of images to 1 or 4, or the number of rings (the RND(6) in DEF PROCrings).

THE CREST OF A WAVE

Program: Wave8, LazyFnt, LazyMes
Description: Graphic demo
Authors: Matthew Goldbolt, Richard Talbot-Watkins
Machine: Eight-bit only
Listings: 480 lines machine code, 40 and 70 lines Basic

This just goes to prove that you don't need expensive computers to produce impressive scrolly messages.

Once, there once was a time when BBC owners were prepared to watch their messages crawl tediously, and boringly, across the bottom of the screen. Then came the sine-wave scroller which, while being very pretty, is now commonplace and obsolete. And now, exclusive to *Acorn User*, we present the beginning of a new era of scrolltexts; the continous wave-motion scroller.

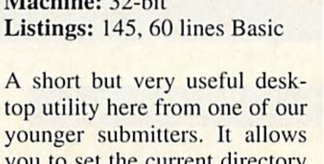
Other scrollers are content with printing letters at different heights – and then leaving them there! *Wavy Scroller* continously updates the entire screen, moving each letter up and down in a variety of ways.

The program itself runs in Mode 2 and uses two screens. One is updated while the other is displayed; normal in smooth animations. Each letter is split into its four component byte columns, and these are printed at heights according to a number of pre-defined tables.

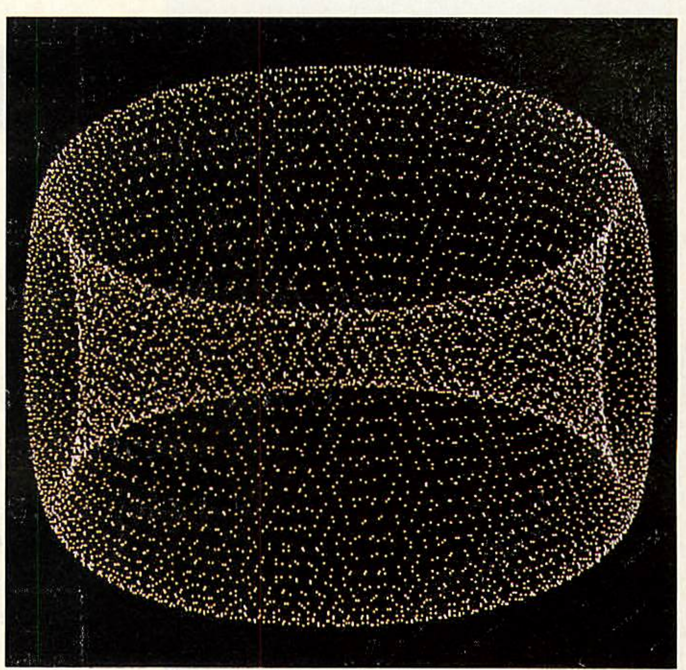
To run the program, a number of data files are required; these are created by running *LazyMes* and *LazyFnt* which create *Message* and *Chars* respectively. The actual program is called *Wave8*, and must be run with PAGE set to &3000. The code itself clears the source program when run, so do make sure the program has been previously saved.

GOTODIR

Program: !GotoDir (!RunImage, GotoSpr)
Description: Desktop utility
Author: Chris Meighan
Machine: 32-bit
Listings: 145, 60 lines Basic



A short but very useful desktop utility here from one of our younger submitters. It allows you to set the current directory



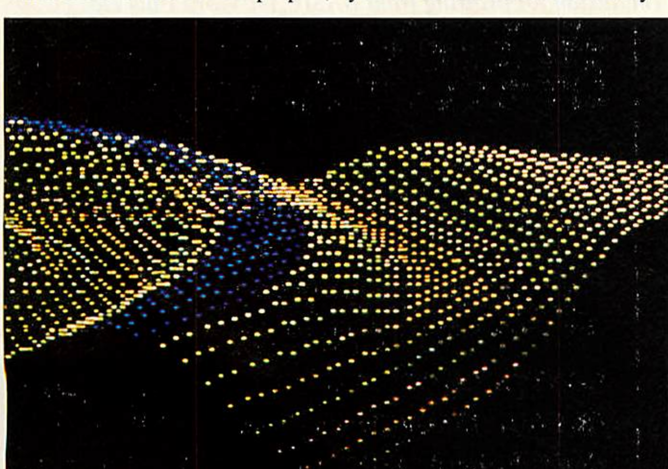
Warning: prolonged viewing of these dots can damage your mental health

while in the desktop so you're in the right place when you come out of the desktop. It's also very handy for running non-desktop style programs that are looking for other files in their directories.

To use *!GotoDir* first create a directory of that name and enter and save *!RunImage* within it. Now go into the directory, enter and run *Goto_Spr* which creates the sprite file. Finally, create a *!Run* file in *Edit* with the following lines:

```
SET Goto$Dir <Obey$Dir>
Wimpslot -min 16K -max 16K
<Obey$Dir>.!Runimage
```

Now double-click to install. To go to a particular directory just drag something inside it onto the *GotoDir* icon. A beep will sound to confirm you have selected the directory. Quit the application using the simple menu.



I'm not Waving, I'm programming

MORE RIPPLES

Program: Ripples
Description: Graphic demo
Author: Tim Jones
Machine: 32-bit
Listing: 200 lines m/c

Inspired by our program *Waves* in the September 1992 issue, Tim has produced his own 'ripply' demo. Use the mouse to waggle a corner of the three-dimensional surface displayed and watch the waves travel along its surface. Hold down any mouse button to release the corner and let the surface float freely.

Tim suggests changing xsize and ysize to alter the size of the surface, xmouse and ymouse to select which dot is controllable, and zoom to zoom in or out. He also warns that for speed no check is made for dots escaping the screen, so don't ripple too much or the program will crash. If you do, change mode and try again.

ONE-LINE CORNER

Well, not so much a corner as a bonanza. We haven't featured many one-line wonders for a while so we have no less than *seven* for you now.

Morgan Henry's *1LEat-Desk* is a one-line application that will proceed to chew and digest your desktop. Press SHIFT to stop it.

1Slide comes from **Stephen Ramplin** and is a traditional sliding block puzzle, albeit on a single line. Use Z, X, : and / to move the letters so they are once more in alphabetical order. When complete, press SPACE for another go or Q to quit. *1Slide* works on all machines.

A pair of fractal one-liners comes from **Richard Seago**. *1LJulia* and *1LMand* plot the good old Julia and Mandelbrot sets respectively. Both run in mode 15 on a 32-bit machine, so have enough screen memory set aside. You'll need to enter a couple of values for

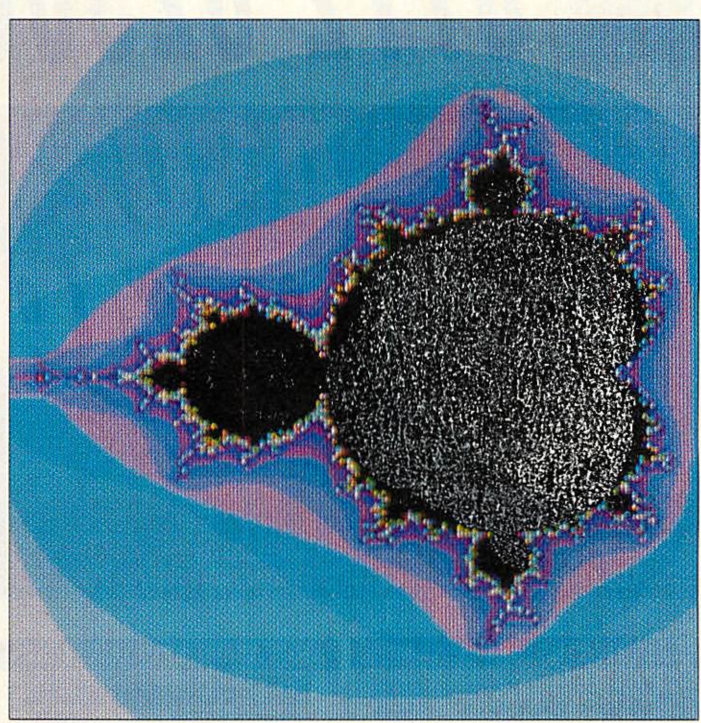
1LJulia – try 0.2 and 0.4 for starters. Both one-liners save the screen with an appropriate name when done.

Torus comes from regular **Jan Vibe** and plots a curiously 3D toroid (or should that be toroidal, toric, or toral even?) shape. Press any key for a new one. The listing works on all machines, but rather slowly on the eight-bit variety.

Another familar name – **Andrew Young** – is behind *Weird1l*. This is one of those strange colour-cycling entities and the result produced is very effective.

Finally, *One-Kal* is our own one-line kaleidoscope, inspired by the bigger version elsewhere in these pages. Move the mouse horizontally to alter rotation speed and vertically to move the shapes in and out.

You can also hold down various combinations of mouse buttons to change the effects produced. *One-Kal* uses some truly awful space-saving devices. System sprite workspace is used, so have at least 32K configured. The most horrid bodge is to use PAGE – using just one byte – as a pointer to a sprite name. There will always be an empty string at PAGE and, it seems, a null sprite name is perfectly valid – yeuch!



A familiar friend: captured in just one line of code

*QUIT

Listings, applications, hints, tips, requests always welcome. All but the shortest listings should be on disc together with a description. *Please write your name and address on all discs.* An SAE will ensure the return of your disc. If you are a particularly young (or old) reader, please let us know your age.

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*DISC

Various extras have been included on the monthly disc in a thinly veiled attempt to get you to part with your cash and take out a subscription.

Wallace Varley has produced a delightful animation-cum-clock for the Arc. His *Garden* should help you all relax after a hard day hunched over a hot computer.

Brian Higgins, one of our Dublin-resident programming nutters, has supplied us with a couple of useful utilities for C programmers. There's a listing beautifier and a function tracer, both proper desktop applications complete with source code,

BEGINNERS' BIT

In the last two installments of Beginner's Bit, we examined the myriad of ways there to forcibly extract information from the user via GET, INKEY & INPUT and their machine code equivalents. Staying in the realms of machine code, we're going to dig out the biggest magnifying glass we can find and take a shoofty at the end of the stick; character output.

In Basic we have the statements PRINT and VDU, and between the two – with some nifty use of punctuation marks – you can display information in just about any format you'd like. In machine code – we're dealing with the eight-bit flavour here – we don't have the luxury of PRINT, we simply have a lovingly hand crafted operating system call with the dainty, lilting name of OSWRCH. That's Operating System WRite CHaracter. This sends the contents of the accumulator (A) to the VDU drivers. It is therefore exactly equivalent to Basic's VDU command. To print a single 'M' character, one would use: LDA #ASC"M" : JSR &FFEE, where &FFEE is the address of OSWRCH.

To do anything more complicated than print a single character, you'd be wise to use a routine like the one in OSWRCH1, which prints a zero teminated string. There are only two other related calls. The first is called OSNEWL (at &FFE7) and simply outputs characters 10 and 13; meaning it performs a newline. The second is OSASCI (at &FFE3) and is exactly the same as OSWRCH except it automatically prints a character 10 before any character 13s. This could save you a byte or two when printing out some textual strings.

Taking a giant step forward and quadrupling the number of bits, RISC OS provides no less than six ready-packaged operating system calls to output characters. The simplest of this is OS_WriteC which is exactly the same as the Beeb's OSWRCH call. It directs the low byte (bits 0-7) of R0 to the VDU drivers. Our 'M' example in Arm code would be: MOV R0,#ASC"M":SWI "OS_WriteC"

There is, however, a very neat way of printing a single, known, character. SWI numbers &100 to &1FF are used to print the character in low eight bits. Thus SWI &14D would also print an M – &4D = 77 = ASCII"M". For clarity, people would usually write &14D as &100+77 or 256+ASC"M". SWI &100 is often referred to as OS_WriteI (I for Immediate). So you may well see lines of code such as: SWI OS_WriteI+ASC"M" (although the Basic assembler doesn't allow this). The main advantages of these calls is that no registers are used and no flags are upset, making them ideal for debugging code. There is also a parallel to the Beeb's OSNEWL routine; in RISC OS it is called OS_NewLine, but the effect is the same.

Moving on through the available calls, the next three are all used for printing whole strings of characters. The difference between them being where the string is read from and how long it is. With OS_WriteS it is taken to start at the very next byte after the SWI call and to end at the first zero byte. The next instruction to be executed will be at the next word boundary (multiple of four bytes). The program OS_WriteS shows this in action. Note the use of ALIGN to ensure that the next instruction starts on a word boundary.

The next call, OS_Write0, also prints a zero-terminated string, but uses R0 as a pointer to its start. Have a look at OS_Write0 to see this in practise. Here, ADR is used to make R0 point to the string, but it could equally well be calculated or loaded from an address. One bonus feature of OS_WriteC is that R0 returns pointing to the byte after the terminating zero. *WriteList* shows how this feature can be used to print lists out very easily.

The last simple call, OS_WriteN uses R0 in the same way as OS_Write0 but instead uses R1 to denote the number of characters to print rather than relying on a 0-terminator. If you wanted to send the VDU codes to choose colour 3 (GCOL 3 or VDU 18,0,3) you would not be able to use any of the string routines discussed so far as the sequence contains a 0, and these routines will think that is a terminator. OS_WriteN prints the same message as all the other examples, but includes VDU codes to invert the text colours. OS_WriteN is used here because we want the EQUB 0 to be sent to complete the VDU sequence rather than terminate the string.

Next month, we'll be looking at some more advanced methods of outputting text and more.

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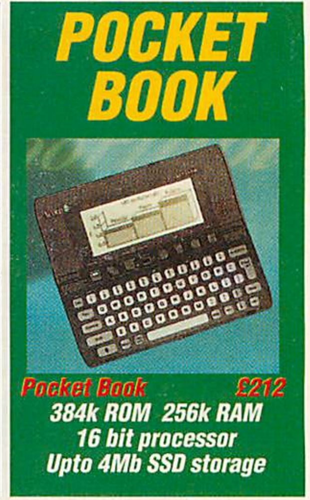
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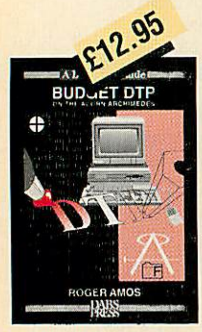
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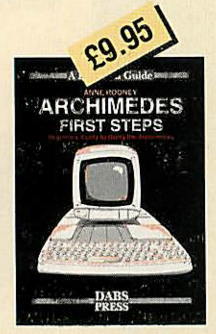
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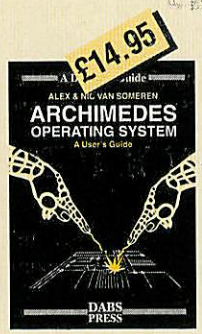
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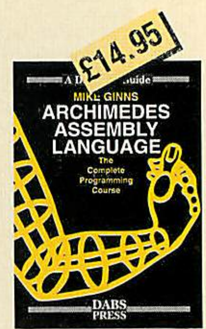
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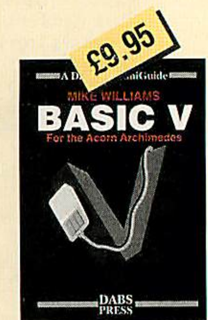
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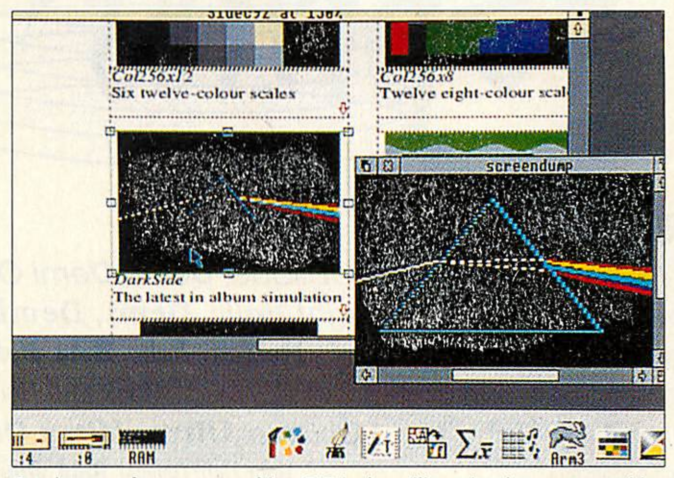


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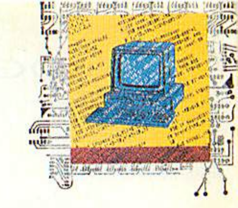
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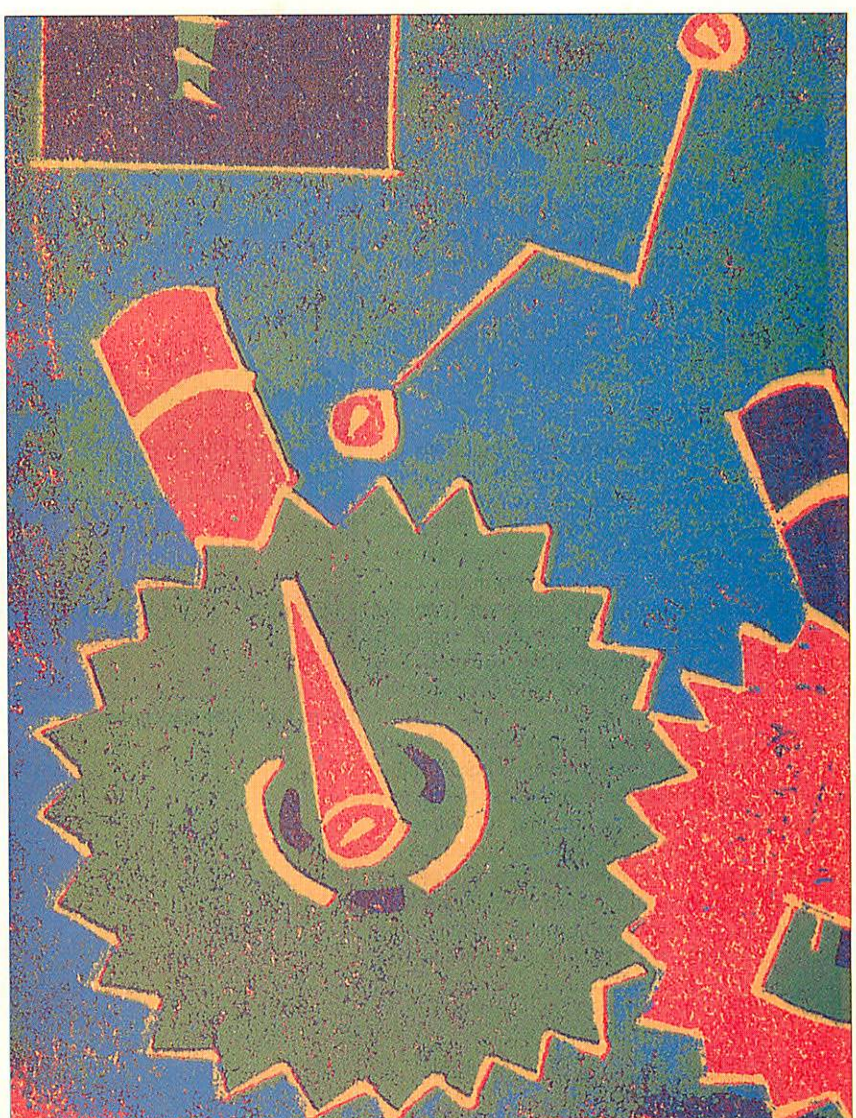
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PAUL SCHOFIELD

ASSEMBLY LINE

Dave Lawrence explains more about Arm programming

Now you've met the instructions for stacking and unstacking registers, you'll need to know what all those brackets and commas mean. The examples last month used the two instructions:

```
STMFD (sp)!,{link}
LDMFD (sp)!,{pc}
```

Despite the ludicrous amount of punctuation in these two lines, they are actually remarkably simple, and, of course, you don't need to know the precise ins and outs of the syntax to be able to use them.

Please note that in the descriptions below I will only refer to pushing data onto a stack, but the principles outlined apply equally well to pulling data off.

MULTIPLE REGISTERS

In more detail then, and just to be contrary, starting from the end of the line, the curly brackets contain a list of the registers that should be pushed onto the stack. In the above example we are pushing only the link register. If we wanted to push R0 as well we would write:

```
STMFD (sp)!,{R0,link}
```

that is we separate the registers by commas. To push R1, R2, R3 and R4, you'd use:

```
STMFD (sp)!,{R1,R2,R3, link}
```

Most assemblers provide a short cut for writing this though and allow:

```
STMFD (sp)!,{R1-R3,link}
```

The actual instruction assembled will be identical, but it's just a little quicker to type; and read. You may be wondering why you need to stack other registers at all. Well, it's actually for the same reason that you stack the link register; so that it can be used again without problem. In Basic, you have access to a practically unlimited supply of variable names and, if that isn't enough, you can also declare some as LOCAL to allow you to re-use variable names within functions and procedures. In Arm code you have the restriction of only 13 registers with which you have to do everything.

The Basic program *Arm1* shows the potential problem. As with many of my example programs, it's just a tad contrived but it does illustrate the point. The program should print out a small portion of a multiplication table, but without the LOCAL in PROCtable it doesn't do very well. The reason for this is plain enough – we are using R0 at two different points for two different jobs. In Basic, LOCAL allows us to do this because it 'isolates' the R0 in the subroutine from the R0 in the main program.

We can perform the same function in Arm code by stacking R0 at the start of the routine (when we stack link) and pulling it off again at the end (when we retrieve pc). In the body of the subroutine we can therefore safely make use of R0 with the knowledge that we can return with its entry value intact.

Arm2 is a machine code version of *Arm1*. The routine at .table performs the same function as PROCtable. It stacks both R0 (so we can use it again) and the link register (because table itself calls another subroutine.) This subroutine call is actually a good deal less contrived than the one to table. The routine print takes the number in register R2 and uses a couple of operating system calls (the SWIs) to print out the number in decimal. The first of these routines (OS_ConvertCardinal4) needs R0, R1 and R2 to be set to various values, but, of course, we are using these registers elsewhere in our program. Print therefore pushes all three onto the stack along with the link pointer (note the use of the '-' to imply a range of registers). R0 is then copied

from R2 – the number to print – and R1 and R2 are set up to describe a little area of workspace. After the number has been printed, control returns to the calling routine along with the original values of R0 to R2.

One final point before we move on, it makes no difference in what order you list the registers. When the instruction is assembled, 16 bits of the whole 32-bit word are used to say which registers to push. So all the following are equivalent:

```
STMFD (sp)!,{r0,r3,r6-r9}
STMFD (sp)!,{r6,r0,r7-r9,r3}
STMFD (sp)!,{R9,r8,r7,r6,r3,r0}
```

TYPES OF STACK

As you know by now, these stack functions are really STore Multiple instructions, meaning store more than one register. As we are only supplying one address, where are all those registers actually stored? This is where the two letters after the STM come in, the FD in this case. Since there are actually four different types of stack and two different ways of describing each one, this gives us eight possible suffixes. But don't worry, in general you'll only ever see two of them.

Going back a couple of months, you may remember the sticky memo notes. There I mentioned that when we humans stack things we normally put them one of top of another, whereas it is quite common for computers to start at the top and work down. There is a practical reason for this and figure one shows you what I mean. If a user's program is loaded at the base of memory, the space for variables can work upwards from the top of the program and the stack downwards from the top of memory; 'attacking' the spare memory from two sides.

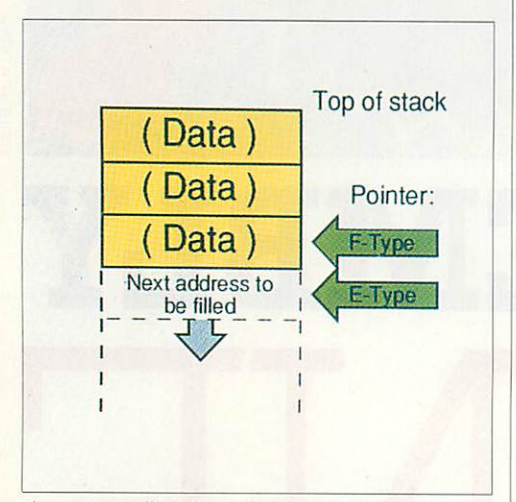


Figure 2: not all stacks work the same way

This means that no predefined stack space needs to be allocated. The variable space will slowly grow and the stack will grow and shrink totally independent of them. This being the case, you will be using a descending stack; and there are no prizes for guessing what the 'D' in 'FD' stands for.

The 'F' is a little more tricky. Whenever you are keeping a list of something, you need to know where the end of the list is so you can add more things to it. We have already met the stack pointer which serves exactly this purpose, but does the stack pointer point to the next location where something can be stored, or does it point to the last entry to be added?

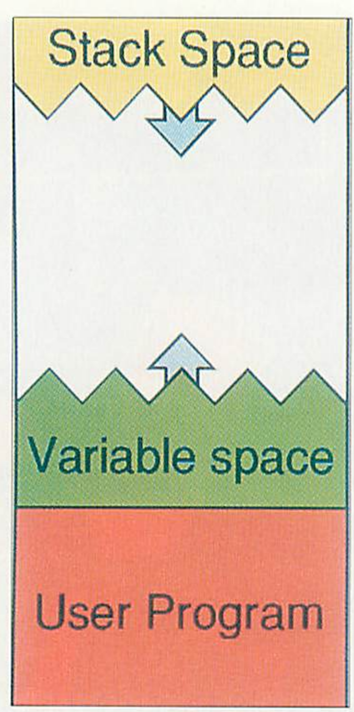


Figure 1: how the stack grows

In other words, do we store the next entry at the stack pointer and then move it on, or do we move it on first and store the entry at its new value? An 'FD' stack does the latter, 'F' stands for Full, meaning that the stack pointer points to an address that is 'Full', in other words occupied. An 'E' type stack is an Empty one; the stack pointer points to an 'Empty' (unused) address. Figures two shows the difference between the two.

I said there were four sorts of stack, but only described and illustrated two; perhaps you can guess what the other two sorts are? If I tell you that instead of a 'D' you have an 'A' then maybe that gives it away. Ascending stacks work in exactly the same way as the descending variety (in terms of Full and Empty) but pretty obviously work upwards in memory instead of downwards. When you set up a stack, you must make it very clear to any potential users of the stack what sort it is; trying to store data on a full descending stack thinking it's an empty ascending one could have some very nasty reprocussions. You can therefore work out that Risc OS provides a full descending one.

We'll meet the other method of describing stacks next month which just leaves me enough space to explain the '(sp)! As you know, sp is the stack pointer (R13) and is the address at which the values will be stacked. The brackets are needed by the Basic assembler for some weird and wonderful reason – if you supply a register number (rather than an alias), you don't need them. The exclamation mark performs exactly the same function as it does in LDR and STR; meaning write back. If it is present, the register given (sp in this case) will be updated after all the registers have been pushed. With a full descending stack:

```
STMFD (sp)!,{R0,R1}
is equivalent to:
STR R1,[sp,#-4]!
STR R0,[sp,#-4]!
```

. . . although it's a lot more efficient in time and space. Without the '!' it would be the same as:

```
STR R1,[sp,#-4]
STR R0,[sp,#-8]
```

. . . and the stack pointer would remain pointing to the same value. Believe it or not, this does actually serve a useful function, but I'm not going to tell you what it is yet. In practically all cases, you will use the write back function as you will invariably need the stack pointer ready to be used again. Without it, your stack can get corrupted unless you're very careful.

That's the end of stacks as such, although you'll be seeing plenty of STMFD in my last few example programs. The other notation for describing them? Never fear, you'll see that next month all right, but the notation used is not really geared for describing what a stack looks like; it is more closely linked to how the Arm actually stores the registers. Anyway, that's next month's story.

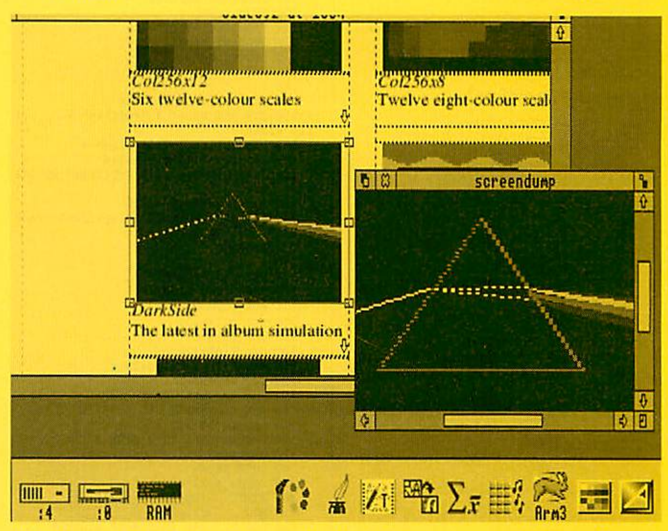
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Info7	*Ominoes*	*	*
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Info9	*Exhaust*	*	*
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Info18	*1LSlide*	*	*
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ArcAss2	*Arm2*		*



BIO, the very flexible desktop application that serves as a skeleton for your own Risc OS applications. New modules are added by creating a directory inside the !BIO library folder, along with the sprites that the module uses. Then the routine is easily accessible from the desktop.

OF SPRITES AND MEN

Listing 1 – MakeSpr

```
10 REM >MakeSpr (Games1)
20 REM Create demo sprite file
30 REM by Dave Acton
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 DIM q% &100,w% &1000
80 READ file$,type%,olen%
90 line%=0
100 d$=""
110 i%=0
120 WHILE i%<olen%
130 b$=FNc
140 IF b$>="a" AND b$<="z" THEN
150 off%=-EVAL("&"+FNc+FNc)
160 FOR k%=0 TO (ASC(b$)-ASC"a"+2)
170 w%?i%=w%?(i%+off%)
180 i%+=1
190 NEXT
200 ELSE
210 w%?i%=EVAL("&"+b$+FNc)
220 i%+=1
230 ENDIF
240 ENDWHILE
250 SYS "OS_File",10,file$,type%,,w%,w
%+olen%
260 PRINT"Sprite file created"
270 END
280 :
290 DEF FNc
300 LOCAL c$
310 IF d$="" THEN
320 READ d$,ch$
330 line%+=1
340 $q%=d$
350 SYS "OS_CRC",0,q%,q%+LEN(d$),1 TO
crc%
360 IF crc%<>EVAL("&"+ch$) PRINT"Error
 in data line ";line%:END
370 ENDIF
380 c$=LEFT$(d$,1)
390 d$=MID$(d$,2)
400 =c$
410 :
420 DATA "Sprites",&FF9,&C84
430 DATA 0600000010a04880C00002C,2487
440 DATA 020000726F636B6574a15a1,ABCE
450 DATA 803a1C0Fd0B001Fa282Ca2C,3820
460 DATA 2C0100000De14e1Bj0E1711,C4C4
470 DATA B151715m10k1013a2013m10,3B37
480 DATA m10j2011c3011f7EFCa10FC,F7F3
490 DATA a10FCe0FFDe10FDd11m1000,BDF2
500 DATA FDc34g0AxC4z1Ez3AbFBFF1,9CBA
510 DATA 5BFFFF111m10a1Fk21m10n2,C5C0
520 DATA 0c2Fh52e0Ff63g0Fe74m10d,A312
530 DATA 9BcA0mA5zFFwFF2C0300007,3376
540 DATA 26F636BfFF05aFF0FeFDb08,D2AB
550 DATA 2CaFFAC0100000Dz6CbFB10,1FB0
560 DATA 1010060606n921406100630,B80E
570 DATA 0432333004p2D3132043230,99AB
580 DATA 3333k2F3110320630320431,A7CF
590 DATA 330632j5C14060604040404,47FC
600 DATA 063030a04i5Ea75a2C04043,C257
610 DATA 307040407hFFa75a8D04043,3D6C
620 DATA 033060731i1814140706333,6A2A
630 DATA 204330406a0431iBC061406,476E
640 DATA 07323132a460430i1806aD5,1C91
650 DATA 313104063206063232i7800,7B48
660 DATA 06141406aD6b96jA8a49b92,8B64
670 DATA 07313007300061F10607061 0,5805
680 DATA 043332j5EeDC10063006o16,B8F
690 DATA n26z20dF8FFFFFFFFFFFFs1,7995
700 DATA 6p1Ah17133u18j2Fj64u18z,A8E2
710 DATA 30z48z60x91zD8qF1k17gF3,77CC
720 DATA n16n26cF42C040000736869,82E9
730 DATA 70fFF07aF20FeF61Fb20b24,E0F7
740 DATA 0200000Dz4Ez6Az38nB8535,AF5E
750 DATA 352525252a04a0753u22535,1EE3
760 DATA 3a04d07sE1F4F4F4F4a04d0,438C
770 DATA 7sFFF5F5F5F5a04d07c0DmD,265C
780 DATA CF6F6F6F6a04F6F6242424a,4122
790 DATA 0424a10q7E5353F7F7F7F7a,5660
800 DATA 04d07r40g49e40z80zC0hE9,9278
810 DATA k82q1E52525252a04b07sFC,BAC8
820 DATA r15z29z45z61z7Dx99FFFFF,3E73
830 DATA FFFa04d07z22z22z44p66r6,4EB6
840 DATA Bp21e8Dq19rAFz1Ez80zE2z,DF87
850 DATA DEzFCpFFu18z2FeDCFCaE46,310C
860 DATA 2616C6CfEB01aF40CeF813a,EA1A
870 DATA FF2CaFF94aEA09kB7B0BBd0,D8B
880 DATA 7BBBBc09a06BB0Bc080BB0a,708C
890 DATA 08b17b19e08g10a28a22e08,79EC
900 DATA b30f40f50kFDF0aEEa04b08,407F
910 DATA F0bFBa10a07FF0Fe08a08b1,DB8
920 DATA 7FFa06e08g10n28g40g54d6,6763
930 DATA 0fFC5F7371736831zFCp9Eh,BCF3
940 DATA B0dD3fDCB0aE1bFCcEAc0Cd,268E
950 DATA F5e08g10bFBcFDe38d48h9C,9FC8
960 DATA fA4h10aFBbC4mFCcFBcF8h0,2DC7
970 DATA Bj15f28f38f48kFC32zFCbF,44D5
980 DATA DB0bAAhECbBDd17bEFcBBe0,9872
```

```
 990 DATA 8dCCfD4m10cF5e08d51eFBg,26E8
1000 DATA 60bF8iECbE5e08cBCfC4fCC,FCB0
1010 DATA m10gE4f30f40f50d60FF,4339
1020 DATA *
```

Listing 2 – BasicSPR1

```
   10 REM >BasicSpr1 (Games2)
   20 REM Simple sprites in Basic
   30 REM by Dave Acton
   40 REM for 32-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 MODE 13
   80 OFF
   90 PROCload_sprites
  100 PROCinit_rocks
  110 PROCanimate
  120 END
  130 :
  140 DEF PROCload_sprites
  150 SYS "OS_File",5,"sprites" TO ,,,,f
ile_size%
  160 DIM sprites% file_size%+4
  170 !sprites%=file_size%+4
  180 SYS "OS_File",255,"sprites",sprite
s%+4
  190 sprite_op%=46
  200 SYS sprite_op%,&118,sprites%,"rock
"     TO ,,spr_rock%
  210 ENDPROC
  220 :
  230 DEF PROCinit_rocks
  240 rocks%=16
  250 DIM rockx(rocks%),rocky(rocks%),ro
ckdx(rocks%)
  260 FOR i%=1 TO rocks%
  270 rockx(i%)=RND(1400)
  280 rocky(i%)=i%*1024/(rocks%-1)
  290 rockdx(i%)=RND(16)
  300 NEXT
  310 ENDPROC
  320 :
  330 DEF PROCanimate
  340 bank%=1
  350 REPEAT
  360 WAIT
  370 SYS "OS_Byte",112,bank%
  380 bank%=3-bank%
  390 SYS "OS_Byte",113,bank%
  400 CLS
  410 FOR i%=1 TO rocks%
  420 SYS sprite_op%,&222,sprites%,spr_r
ock%,rockx(i%),rocky(i%)
  430 rockx(i%)-=rockdx(i%)
  440 IF rockx(i%)<-100 rockx(i%)+=1380
  450 NEXT
  460 UNTIL FALSE
  470 ENDPROC
```

Listing 3 – BasicSpr2

```
   10 REM >BasicSpr2 (Games3)
   20 REM Simple sprites in Basic
   30 REM by Dave Acton
   40 REM for 32-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 MODE 9
   80 OFF
   90 PROCpalette
  100 PROCload_sprites
  110 PROCinit_balls
  120 PROCmake_background
  130 PROCanimate
  140 END
  150 :
  160 DEF PROCload_sprites
  170 SYS "OS_File",5,"sprites" TO ,,,,f
ile_size%
  180 DIM sprites% file_size%+4
  190 !sprites%=file_size%+4
  200 SYS "OS_File",255,"sprites",sprite
s%+4
  210 sprite_op%=46
  220 SYS sprite_op%,&118,sprites%,"ball
"       TO ,,spr_ball%
  230 SYS sprite_op%,&118,sprites%,"ball
_sqsh1" TO ,,spr_sqsh1%
  240 SYS sprite_op%,&118,sprites%,"ball
_sqsh2" TO ,,spr_sqsh2%
  250 ENDPROC
  260 :
  270 DEF PROCpalette
  280 COLOUR 11,1
  290 COLOUR 0,7
  300 COLOUR 7,0
  310 ENDPROC
  320 :
  330 DEF PROCinit_balls
  340 balls%=20
  350 DIM ballx(balls%),bally(balls%)
  360 DIM balldx(balls%),balldy(balls%)
  370 DIM ballspr%(balls%),ballsq%(balls
%)
  380 FOR i%=1 TO balls%
  390 ballx(i%)=RND(1000)+140
  400 bally(i%)=RND(800)+50
  410 balldx(i%)=RND(20)
  420 balldy(i%)=RND(20)
  430 ballspr%(i%)=spr_ball%
  440 ballsq%(i%)=0
  450 NEXT
  460 ENDPROC
  470 :
  480 DEF PROCanimate
  490 bank%=1
  500 REPEAT
  510 WAIT
  520 SYS "OS_Byte",112,bank%
  530 bank%=3-bank%
  540 SYS "OS_Byte",113,bank%
  550 SYS sprite_op%,&122,back_spr%,"bg"
,0,0,0
  560 FOR i%=1 TO balls%
  570 SYS sprite_op%,&222,sprites%,balls
pr%(i%),ballx(i%),bally(i%),8
  580 IF ballsq%(i%)>0 THEN
  590 ballsq%(i%)-=1
  600 IF ballsq%(i%)=0 ballspr%(i%)=spr_
ball%
  610 ELSE
  620 ballx(i%)+=balldx(i%)
  630 bally(i%)+=balldy(i%)
  640 ENDIF
  650 IF ballx(i%)<0 THEN
  660 ballx(i%)=0
  670 balldx(i%)=-balldx(i%)
  680 ballspr%(i%)=spr_sqsh2%
  690 ballsq%(i%)=1
  700 ENDIF
  710 IF ballx(i%)>1216 THEN
  720 ballx(i%)=1216
  730 balldx(i%)=-balldx(i%)
  740 ballspr%(i%)=spr_sqsh2%
  750 ballsq%(i%)=1
  760 ENDIF
  770 balldy(i%)-=1
  780 IF bally(i%)<0 THEN
  790 bally(i%)=0
  800 balldy(i%)=-balldy(i%)
  810 ballspr%(i%)=spr_sqsh1%
  820 ballsq%(i%)=1
  830 ENDIF
  840 NEXT
  850 UNTIL FALSE
  860 ENDPROC
  870 :
  880 DEF PROCmake_background
  890 GCOL 135
  900 CLG
  910 GCOL 0
  920 FOR star%=1 TO 64
  930 POINT RND(1280),RND(1024)
  940 NEXT
  950 DIM back_spr% 41*1024
  960 !back_spr%=41*1024
  970 back_spr%!4=0
  980 back_spr%!8=16
  990 back_spr%!12=16
 1000 SYS sprite_op%,&110,back_spr%,"bg"
,,0,0,1279,1023
 1010 ENDPROC
```

Listing 4 – Code1Spr

```
   10 REM >CodeSpr1 (Games4)
   20 REM Machine-code sprites
   30 REM by Dave Acton
   40 REM for 32-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 MODE 13
   80 OFF
   90 PROCload_sprites
  100 PROCassemble
  110 PROCmake_background
  120 PROCinit_rocks
  130 PROCanimate
  140 END
  150 :
  160 DEF PROCload_sprites
  170 SYS "OS_File",5,"sprites" TO ,,,,f
ile_size%
  180 DIM sprites% file_size%+4
  190 !sprites%=file_size%+4
  200 SYS "OS_File",255,"sprites",sprite
s%+4
  210 sprite_op%=46
  220 SYS sprite_op%,&118,sprites%,"rock
" TO ,,rock_spr%
  230 ENDPROC
  240 :
  250 DEF PROCassemble
  260 DIM code% &1000
  270 scr_top%=0
  280 scr_bot%=256
  290 scr_lef%=0
  300 scr_rig%=320
  310 sp=13:link=14:pc=15
  320 spr_width%=16
  330 spr_height%=20
  340 spr_image%=32
  350 spr_mask%=36
  360 FOR pass%=0 TO 2 STEP 2
  370 P%=code%
  380 [OPT pass%
  390 .show_sprite
  400 STMFD   (sp)!,{r0-r12,link}
  410 MOV     r12,r0
  420 LDR     r10,[r12,#spr_width%]
  430 ADD     r10,r10,#1
  440 MOV     r10,r10,LSL #2
  450 LDR     r11,[r12,#spr_height%]
  460 ADD     r11,r11,#1
  470 LDR     r4,[r12,#spr_image%]
  480 ADD     r4,r4,r12
  490 LDR     r5,[r12,#spr_mask%]
  500 ADD     r5,r5,r12
  510 CMP     r2,#scr_top%    ; off top
of screen?
  520 RSBLT   r14,r2,#scr_top%
  530 MULLT   r6,r10,r14
  540 ADDLT   r4,r4,r6
  550 ADDLT   r5,r5,r6
  560 SUBLT   r11,r11,r14        ; adjust
height...
  570 MOVLT   r2,#scr_top%    ; ...and s
tart row
  580 ADD     r14,r2,r11
  590 CMP     r14,#scr_bot%    ; off bot
tom of screen?
  600 SUBGT   r14,r14,#scr_bot%
  610 SUBGT   r11,r11,r14       ; adjust h
eight
  620 MOV     r12,#0
  630 CMP     r1,#scr_lef%
  640 RSBLT   r14,r1,#scr_lef%
  650 SUBLT   r10,r10,r14
  660 ADDLT   r1,r1,r14
  670 ADDLT   r4,r4,r14
  680 ADDLT   r5,r5,r14
  690 ADDLT   r12,r12,r14
  700 ADD     r14,r1,r10
  710 CMP     r14,#scr_rig%
  720 SUBGT   r14,r14,#scr_rig%
  730 SUBGT   r10,r10,r14
  740 ADDGT   r12,r12,r14
  750 CMP     r10,#0
  760 LDMLEFD (sp)!,{r0-r12,pc}
  770 .yloop  CMP     r11,#0
  780 LDMLEFD (sp)!,{r0-r12,pc}
  790 LDR     r3,vduo
  800 ADD     r3,r3,r2,LSL #8
  810 ADD     r3,r3,r2,LSL #6
  820 ADD     r3,r3,r1
  830 MOV     r7,r10
  840 .xloop  TST     r4,#3
  850 BNE     byte
  860 CMP     r7,#4
  870 BGE     word
  880 .byte   LDRB    r0,[r3]
  890 LDRB    r8,[r4],#1
  900 LDRB    r9,[r5],#1
  910 BIC     r0,r0,r9
  920 ORR     r0,r0,r8
  930 STRB    r0,[r3],#1
  940 SUBS    r7,r7,#1
  950 BNE     xloop
  960 B       next_y
  970 .word   LDRB    r0,[r3]
  980 LDRB    r14,[r3,#1]
  990 ORR     r0,r0,r14,LSL #8
 1000 LDRB    r14,[r3,#2]
 1010 ORR     r0,r0,r14,LSL #16
 1020 LDRB    r14,[r3,#3]
 1030 ORR     r0,r0,r14,LSL #24
 1040 LDR     r8,[r4],#4
 1050 LDR     r9,[r5],#4
 1060 BIC     r0,r0,r9
 1070 ORR     r0,r0,r8
 1080 STRB    r0,[r3],#1
 1090 MOV     r0,r0,LSR #8
 1100 STRB    r0,[r3],#1
 1110 MOV     r0,r0,LSR #8
 1120 STRB    r0,[r3],#1
 1130 MOV     r0,r0,LSR #8
 1140 STRB    r0,[r3],#1
 1150 SUBS    r7,r7,#4
 1160 BNE     xloop
 1170 .next_y ADD     r2,r2,#1         ;
next row
 1180 ADD     r4,r4,r12
 1190 ADD     r5,r5,r12
 1200 SUB     r11,r11,#1
 1210 B       yloop
 1220
 1230 .vdui   EQUD    148
 1240 EQUD    -1
 1250
 1260 .vduo   EQUD    0
 1270 EQUD    0
 1280 ]
 1290 NEXT pass%
 1300 ENDPROC
 1310 :
 1320 DEF PROCinit_rocks
 1330 rocks%=16
 1340 DIM rockx(rocks%),rocky(rocks%),ro
ckdx(rocks%)
 1350 FOR i%=1 TO rocks%
 1360 rockx(i%)=RND(350)
 1370 rocky(i%)=RND(256)-8
 1380 rockdx(i%)=RND(4)
 1390 NEXT
 1400 ENDPROC
 1410 :
 1420 DEF PROCanimate
 1430 bank%=1
 1440 A%=rock_spr%
 1450 REPEAT
 1460 WAIT
 1470 SYS "OS_Byte",112,bank%
 1480 bank%=3-bank%
 1490 SYS "OS_Byte",113,bank%
 1500 SYS "OS_ReadVduVariables",vdui,vdu
o
 1510 SYS sprite_op%,&122,back_spr%,"bg"
,0,0
 1520 FOR i%=1 TO rocks%
 1530 B%=rockx(i%)
 1540 C%=rocky(i%)
 1550 CALL show_sprite
 1560 rockx(i%)-=rockdx(i%)
 1570 IF rockx(i%)<-100 rockx(i%)+=420:r
ocky(i%)=RND(256)-8
 1580 NEXT
 1590 UNTIL FALSE
 1600 ENDPROC
 1610 :
 1620 DEF PROCmake_background
 1630 CLG
 1640 FOR star%=1 TO 64
 1650 POINT RND(1280),RND(1024)
 1660 NEXT
 1670 DIM back_spr% 81*1024
 1680 !back_spr%=81*1024
 1690 back_spr%!4=0
 1700 back_spr%!8=16
 1710 back_spr%!12=16
 1720 SYS sprite_op%,&110,back_spr%,"bg"
,,0,0,1279,1023
 1730 ENDPROC
```

Listing 5 – CodeSpr2

```
   10 REM >CodeSpr2 (Games5)
   20 REM Machine-code sprites
   30 REM by Dave Acton
   40 REM for 32-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 MODE 13
   80 OFF
   90 PROCload_sprites
  100 PROCmake_background
  110 PROCinit_rocks
  120 PROCassemble
  130 PROCanimate
  140 END
  150 :
  160 DEF PROCload_sprites
  170 SYS "OS_File",5,"sprites" TO ,,,,f
ile_size%
  180 DIM sprites% file_size%+&2800
  190 !sprites%=file_size%+&2800
  200 SYS "OS_File",255,"sprites",sprite
s%+4
  210 sprite_op%=46
  220 DIM rock_spr%(3),ship_spr%(3)
  230 PROCmake_four("rock",rock_spr%())
  240 PROCmake_four("ship",ship_spr%())
  250 ENDPROC
  260 :
  270 DEF PROCmake_four(orig$,spr%())
  280 SYS sprite_op%,&128,sprites%,"ship
" TO ,,,w%,h%
  290 FOR i%=0 TO 3
  300 CLS
  310 SYS sprite_op%,&122,sprites%,orig$
,4*i%,0
  320 real_width%=(w%+i%+3) AND (NOT 3)
  330 SYS sprite_op%,&110,sprites%,orig$
+STR$i%,,0,0,4*real_width%-1,4*h%-1
  340 SYS sprite_op%,&118,sprites%,orig$
+STR$i% TO ,,spr%(i%)
  350 SYS sprite_op%,&21D,sprites%,spr%(
i%)
  360 FOR x%=0 TO real_width%-1
  370 FOR y%=0 TO h%-1
  380 IF POINT(4*x%,4*y%)=0 b%=0 ELSE b%
=1
  390 SYS sprite_op%,&22C,sprites%,spr%(
i%),x%,y%,b%
  400 NEXT
  410 NEXT
  420 NEXT
  430 ENDPROC
  440 :
  450 DEF PROCassemble
  460 DIM code% &1000
  470 scr_top%=0
  480 scr_bot%=256
  490 scr_lef%=0
  500 scr_rig%=320
  510 sp=13:link=14:pc=15
  520 spr_width%=16
  530 spr_height%=20
  540 spr_image%=32
  550 spr_mask%=36
  560 FOR pass%=0 TO 2 STEP 2
  570 P%=code%
  580 [OPT pass%
  590 .show_sprite
  600 STMFD   (sp)!,{r0-r12,link}
  610 AND     r14,r1,#3
  620 LDR     r12,[r0,r14,LSL #2]
  630 BIC     r1,r1,#3
  640 LDR     r10,[r12,#spr_width%]
  650 ADD     r10,r10,#1
  660 MOV     r10,r10,LSL #2
  670 LDR     r11,[r12,#spr_height%]
  680 ADD     r11,r11,#1
  690 LDR     r4,[r12,#spr_image%]
  700 ADD     r4,r4,r12
  710 LDR     r5,[r12,#spr_mask%]
  720 ADD     r5,r5,r12
  730 CMP     r2,#scr_top%    ; off top
of screen?
  740 RSBLT   r14,r2,#scr_top%
  750 MULLT   r6,r10,r14
  760 ADDLT   r4,r4,r6
  770 ADDLT   r5,r5,r6
  780 SUBLT   r11,r11,r14       ; adjust h
eight...
  790 MOVLT   r2,#scr_top%    ; ...and s
tart row
  800 ADD     r14,r2,r11
  810 CMP     r14,#scr_bot%   ; off bott
om of screen?
  820 SUBGT   r14,r14,#scr_bot%
  830 SUBGT   r11,r11,r14       ; adjust h
eight
  840 MOV     r12,#0
  850 CMP     r1,#scr_lef%    ; off left
?
  860 RSBLT   r14,r1,#scr_lef%
  870 SUBLT   r10,r10,r14
  880 ADDLT   r1,r1,r14
  890 ADDLT   r4,r4,r14
  900 ADDLT   r5,r5,r14
  910 ADDLT   r12,r12,r14
  920 ADD     r14,r1,r10
  930 CMP     r14,#scr_rig%   ; off righ
t?
  940 SUBGT   r14,r14,#scr_rig%
  950 SUBGT   r10,r10,r14
  960 ADDGT   r12,r12,r14
  970 CMP     r10,#0
  980 CMPGT   r11,#0
  990 LDMLEFD (sp)!,{r0-r12,pc}
 1000 .yloop  LDR     r3,vduo
 1010 ADD     r3,r3,r2,LSL #8
 1020 ADD     r3,r3,r2,LSL #6
 1030 ADD     r3,r3,r1
 1040 MOV     r7,r10
 1050 .xloop  LDR     r0,[r3]
 1060 LDR     r8,[r4],#4
 1070 LDR     r9,[r5],#4
 1080 BIC     r0,r0,r9
 1090 ORR     r0,r0,r8
 1100 STR     r0,[r3],#4
 1110 SUBS    r7,r7,#4
 1120 BNE     xloop
 1130 .next_y ADD     r2,r2,#1
next row
 1140 ADD     r4,r4,r12
 1150 ADD     r5,r5,r12
 1160 SUBS    r11,r11,#1
 1170 BNE     yloop
 1180 LDMFD   (sp)!,{r0-r12,pc}
 1190
 1200 .copy_back
 1210 STMFD   (sp)!,{r0-r12,link}
 1220 LDR     r10,vduo
 1230 LDR     r11,back_addr
 1240 LDR     r0,[r11,#spr_image%]
 1250 ADD     r11,r11,r0
 1260 MOV     r12,#80*1024
 1270 .copy_loop
 1280 LDMIA   r11!,{r0-r9}
 1290 STMIA   r10!,{r0-r9}
 1300 LDMIA   r11!,{r0-r9}
 1310 STMIA   r10!,{r0-r9}
 1320 SUBS    r12,r12,#80
 1330 BNE     copy_loop
 1340 LDMFD   (sp)!,{r0-r12,pc}
 1350
 1360 .back_addr
 1370 EQUD    spr_bg%
```

```
1380
1390 .animate
1400 STMFD   (sp)!,{r0-r12,link}
1410 MOV     r10,#1  ; bank
1420 .anim_loop
1430 MOV     r0,#19
1440 SWI     "XOS_Byte"
1450 MOV     r0,#112
1460 MOV     r1,r10
1470 SWI     "XOS_Byte"
1480 RSB     r10,r10,#3
1490 MOV     r0,#113
1500 MOV     r1,r10
1510 SWI     "XOS_Byte"
1520 ADR     r0,vdui
1530 ADR     r1,vduo
1540 SWI     "XOS_ReadVduVariables"
1550 BL      copy_back
1560 ADR     r0,rock_addrs
1570 LDMIA   r0,{r4-r6}
1580 MOV     r9,#rocks%
1590 .show_rocks
1600 ADR     r0,rockspr_addr
1610 LDR     r1,[r4]
1620 LDR     r2,[r5],#4
1630 BL      show_sprite
1640 LDR     r0,[r4]
1650 LDR     r1,[r6],#4
1660 SUB     r0,r0,r1
1670 MVN     r14,#100
1680 CMP     r0,r14
1690 ADDLT   r0,r0,#420
1700 STR     r0,[r4],#4
1710 SUBS    r9,r9,#1
1720 BNE     show_rocks
1730 LDR     r3,ship_y
1740 MOV     r1,#256-66
1750 BL      inkey
1760 BNE     notup
1770 CMP     r3,#0
1780 SUBGT   r3,r3,#4
1790 .notup  MOV     r1,#256-98
1800 BL      inkey
1810 BNE     notdn
1820 CMP     r3,#240
1830 ADDLT   r3,r3,#4
1840 .notdn  STR     r3,ship_y
1850 ADR     r0,shipspr_addr
1860 MOV     r1,#0
1870 LDR     r2,ship_y
1880 BL      show_sprite
1890 SWI     "XOS_ReadEscapeState"
1900 BCC     anim_loop
1910 MOV     r0,#126
1920 SWI     "XOS_Byte"
1930 MOV     r0,#112
1940 MOV     r1,r10
1950 SWI     "XOS_Byte"
1960 LDMFD   (sp)!,{r0-r12,pc}
1970
1980 .ship_y EQUD    112
1990
2000 .inkey  STMFD   (sp)!,{r0-r2,link}
2010 MOV     r0,#129
2020 MOV     r2,#255
2030 SWI     "XOS_Byte"
2040 CMP     r1,#255
2050 LDMFD   (sp)!,{r0-r2,pc}
2060
2070 .rockspr_addr
2080 EQUD    rock_spr%(0)
2090 EQUD    rock_spr%(1)
2100 EQUD    rock_spr%(2)
2110 EQUD    rock_spr%(3)
2120
2130 .shipspr_addr
2140 EQUD    ship_spr%(0)
2150 EQUD    ship_spr%(1)
2160 EQUD    ship_spr%(2)
2170 EQUD    ship_spr%(3)
2180
2190 .rock_addrs
2200 EQUD    rockx%
2210 EQUD    rocky%
2220 EQUD    rockdx%
2230
2240 .vdui   EQUD    148
2250 EQUD    -1
2260
2270 .vduo   EQUD    0
2280 EQUD    0
2290 ]
2300 NEXT pass%
2310 ENDPROC
2320 :
2330 DEF PROCinit_rocks
2340 rocks%=32
2350 DIM rockx% rocks%*4,rocky% rocks%*
4,rockdx% rocks%*4
2360 FOR i%=0 TO rocks%-1
2370 rockx%!(4*i%)=RND(350)
2380 rocky%!(4*i%)=RND(256)-8
2390 rockdx%!(4*i%)=RND(4)
2400 NEXT
2410 ENDPROC
2420 :
2430 DEF PROCanimate
2440 CALL animate
2450 ENDPROC
2460 :
2470 DEF PROCmake_background
2480 CLG
2490 FOR star%=1 TO 64
2500 POINT RND(1280),RND(1024)
2510 NEXT
2520 DIM back_spr% 81*1024
2530 !back_spr%=81*1024
2540 back_spr%!4=0
2550 back_spr%!8=16
2560 back_spr%!12=16
2570 SYS sprite_op%,&110,back_spr%,"bg"
,,0,0,1279,1023
2580 SYS sprite_op%,&118,back_spr%,"bg"
TO ,,spr_bg%
2590 ENDPROC
```

Listing 6 – RotSpr

```
10 REM >RotSpr (Games6)
20 REM Rotating sprites
30 REM by Dave Acton
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 MODE 13
80 OFF
90 PROCload_sprites
100 PROCassemble
110 PROCmake_rot_tab
120 PROCmake_background
130 PROCanimate
140 END
150 :
160 DEF PROCload_sprites
170 SYS "OS_File",5,"sprites" TO ,,,,f
ile_size%
180 DIM sprites% file_size%+4
190 !sprites%=file_size%+4
200 SYS "OS_File",255,"sprites",sprite
s%+4
210 sprite_op%=46
220 SYS sprite_op%,&118,sprites%,"rock
et" TO ,,rocket_spr%
230 ENDPROC
240 :
250 DEF PROCassemble
260 angles=64
270 DIM code% &5000
280 sp=13:link=14:pc=15
290 spr_image%=32
300 FOR pass%=0 TO 2 STEP 2
310 P%=code%
320 [OPT pass%
330 .rotate_sprite
340 STMFD   (sp)!,{r0-r12,link}
350 LDR     r10,[r0,#spr_image%]
360 ADD     r10,r10,r0
370 AND     r3,r3,#angles-1
380 ADR     r12,rot_tab
390 ADD     r12,r12,r3,LSL #8
400 ADR     r11,temp
410 MOV     r8,#32
420 .rotate1
430 LDMIA   r12!,{r4-r7}
440 ]:FOR z%=4 TO 7:y%=z%-4:[OPT pass%
450 MOV     r14,z%,LSL #24
460 LDRB    y%,[r10,r14,LSR #24]
470 MOV     r14,z%,LSL #16
480 LDRB    r14,[r10,r14,LSR #24]
490 ORR     y%,y%,r14,LSL #8
500 MOV     r14,z%,LSL #8
510 LDRB    r14,[r10,r14,LSR #24]
520 ORR     y%,y%,r14,LSL #16
530 LDRB    r14,[r10,z%,LSR #24]
540 ORR     y%,y%,r14,LSL #24
550 ]:NEXT z%:[OPT pass%
560 LDR     r5,[sp,#4]
570 AND     r5,r5,#3
580 MOV     r5,r5,LSL #3
590 RSB     r6,r5,#32
600 MOV     r4,r3,LSR r6
610 MOV     r3,r3,LSL r5
620 ORR     r3,r3,r2,LSR r6
630 MOV     r2,r2,LSL r5
640 ORR     r2,r2,r1,LSR r6
650 MOV     r1,r1,LSL r5
660 ORR     r1,r1,r0,LSR r6
670 MOV     r0,r0,LSL r5
680 STMIA   r11!,{r0-r4}
690 SUBS    r8,r8,#1
700 BEQ     now_plot
710 CMP     r8,#16
720 SUBEQ   r12,r12,#256
730 ADDEQ   r10,r10,#256
740 B       rotate1
750 .now_plot
760 LDMIA   sp,{r0-r2}
770 ADR     r10,temp
780 ADR     r11,temp+320
790 LDR     r12,vduo
800 BIC     r1,r1,#3
810 ADD     r12,r12,r1
820 ADD     r12,r12,r2,LSL #8
830 ADD     r12,r12,r2,LSL #6
840 MOV     r14,#16
850 .plot_loop
860 LDMIA   r12,{r0-r4}
870 LDMIA   r11!,{r5-r9}
880 BIC     r0,r0,r5
890 BIC     r1,r1,r6
900 BIC     r2,r2,r7
910 BIC     r3,r3,r8
920 BIC     r4,r4,r9
930 LDMIA   r10!,{r5-r9}
940 ORR     r0,r0,r5
950 ORR     r1,r1,r6
960 ORR     r2,r2,r7
970 ORR     r3,r3,r8
980 ORR     r4,r4,r9
990 STMIA   r12,{r0-r4}
1000 ADD    r12,r12,#320
1010 SUBS   r14,r14,#1
1020 BNE    plot_loop
1030 LDMFD  (sp)!,{r0-r12,pc}
1040
1050 .vdui  EQUD    148
1060 EQUD   -1
1070
1080 .vduo  EQUD    0
1090 EQUD   0
1100 ]
1110 temp=P%:P%+=640
1120 rot_tab=P%:P%+=16*1024
1130 NEXT pass%
1140 ENDPROC
1150 :
1160 DEF PROCanimate
1170 bank%=1
1180 A%=rocket_spr%
1190 ang%=0
1200 r=2*PI/angles
1210 DIM s(angles),c(angles)
1220 FOR i%=0 TO angles-1
1230 s(i%)=SIN(i%*2*PI/angles-PI/2)
1240 c(i%)=-COS(i%*2*PI/angles-PI/2)
1250 NEXT
1260 REPEAT
1270 WAIT
1280 SYS "OS_Byte",112,bank%
1290 bank%=3-bank%
1300 SYS "OS_Byte",113,bank%
1310 SYS "OS_ReadVduVariables",vdui,vdu
o
1320 SYS sprite_op%,&122,back_spr%,"bg"
,0,0
1330 FOR i%=1 TO 15
1340 D%=(ang%-5*i%) AND (angles-1)
1350 B%=160+9*i%*s(D%)
1360 C%=128+7*i%*c(D%)
1370 CALL rotate_sprite
1380 NEXT
1390 ang%+=1
1400 UNTIL FALSE
1410 ENDPROC
1420 :
1430 DEF PROCmake_background
1440 CLG
1450 FOR star%=1 TO 64
1460 POINT RND(1280),RND(1024)
1470 NEXT
1480 DIM back_spr% 81*1024
1490 !back_spr%=81*1024
1500 back_spr%!4=0
1510 back_spr%!8=16
1520 back_spr%!12=16
1530 SYS sprite_op%,&110,back_spr%,"bg"
,,0,0,1279,1023
1540 ENDPROC
1550 :
1560 DEF PROCmake_rot_tab
1570 FOR a%=0 TO angles-1
1580 PRINTCHR$13"Please wait...";a%;
1590 a=2*PI*a%/angles
1600 FOR y%=0 TO 15
1610 FOR x%=0 TO 15
1620 realx=x%-7.5
1630 realy=y%-7.5
1640 r=SQR(realx*realx+realy*realy)
1650 d=FNatn(realx,realy)-a
1660 wasx%=7.5+r*COSd
1670 wasy%=7.5+r*SINd
1680 IF wasx%<0 OR wasx%>15 OR wasy%<0
OR wasy%>15 THEN wasx%=0:wasy%=0
1690 rot_tab?(256*a%+x%+16*y%)=wasx%+16
*wasy%
1700 NEXT
1710 NEXT
1720 NEXT
1730 FOR x%=0 TO 255
1740 rot_tab?x%=x%
1750 NEXT
1760 ENDPROC
1770 :
1780 DEF FNatn(x,y)
1790 LOCAL a,ax,ay
1800 IF x=0 AND y=0 THEN =0
1810 ax=ABS(x)
1820 ay=ABS(y)
1830 IF ax>ay THEN a=ATN(ay/ax) ELSE a=
PI/2-ATN(ax/ay)
1840 IF x>=0 THEN
1850 IF y<0 a=2*PI-a
1860 ELSE
1870 IF y>=0 THEN a=PI-a ELSE a+=PI
1880 ENDIF
1890 =a
```

Listing 7 – TidyMask

```
10 REM >TidyMask (Games7)
20 REM Remove 'hidden' sprite junk
30 REM by Dave Acton
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 REPEAT
80 INPUT"Sprite file: "spr$
90 SYS "OS_File",5,spr$ TO type%,,,,l
en%
100 UNTIL type%=1
110 DIM s% len%+4,name% &100
120 !s%=len%+4
130 SYS "OS_File",255,spr$,s%+4
140 no%=1
150 REPEAT
160 SYS "XOS_SpriteOp",13+256,s%,name%
,&100,no% TO ,,,l%;ok
170 ok=(ok AND 1)=0
180 IF ok THEN
190 name%?l%=13
200 SYS "OS_SpriteOp",40+256,s%,name%
TO ,,,width%,height%,mask%,mode%
210 IF mask%=1 THEN
220 PRINT"Processing mask for sprite "
;no%
230 FOR i%=0 TO width%-1
240 FOR j%=0 TO height%-1
250 SYS "OS_SpriteOp",43+256,s%,name%,
i%,j% TO ,,,,,m%
260 IF m%=0 SYS "OS_SpriteOp",42+256,s
%,name%,i%,j%,0,0
270 NEXT
280 NEXT
290 ENDIF
300 no%+=1
310 ENDIF
320 UNTIL NOT ok
330 SYS "OS_SpriteOp",12+256,s%,spr$
340 PRINT"File tidied"
350 END
```

A PROGRAM FOR ALL SEASONS

Listing 1 – !RunImage

```
10 REM >!RunImage (Bio1)
20 REM !Bio file processor
30 REM by Dave Acton and Dave Lawrenc
e
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 DIM q% &400
80 $q%="TASK"
90 SYS "Wimp_Initialise",200,!q%,"Bio
" TO version%,mytask%
100 ON ERROR PROCwarn("!Bio has suffer
ed a fatal error ("+REPORT$+" at line "+
STR$ERL+") and must exit"):SYS "Wimp_Clo
seDown":END
110 PROCinit
120 PROCinit_sel
130 done%=FALSE
140 REPEAT
150 SYS "Wimp_Poll",,q% TO reason%
160 CASE reason% OF
170 WHEN 1:PROCredraw(!q%)
180 WHEN 2:SYS "Wimp_OpenWindow",,q%
190 WHEN 3:PROCclose(!q%)
200 WHEN 6:PROCmouse(!q%,q%!4,q%!8,q%!
12,q%!16)
210 WHEN 7:PROCdrag
220 WHEN 8:PROCkey(!q%,q%!4,q%!8,q%!12
,q%!16,q%!20,q%!24)
230 WHEN 9:PROCmenu_select
240 WHEN 17,18:PROCmessage
250 WHEN 19:PROCpop_up_save
260 ENDCASE
270 UNTIL done%
280 SYS "Wimp_CloseDown"
290 END
300 :
310 DEF PROCinit
320 DIM ind% &1400,string% &100,menubu
f% &300,_word% 4,_star% 12
330 DIM temp% &100,ic% 64,mess% &100
340 ind_end%=ind%+&1400
350 library$="<Bio$Dir>.Library"
360 junk$="<Bio$Junk>"
370 type_def$="in/k,out=results/k,dire
ctory=dir/s,send/s"
380 max_lib_files%=32
390 border%=8
400 DIM lib_file$(max_lib_files%),lib_
proc$(max_lib_files%)
410 DIM lib_name$(max_lib_files%),lib_
flags%(max_lib_files%)
420 DIM lib_in%(max_lib_files%),lib_ou
t%(max_lib_files%)
430 DIM proc_icon%(max_lib_files%),win
d_hand%(max_lib_files%)
440 DIM r$(max_lib_files%,10),result_h
and%(max_lib_files%)
450 DIM running%(max_lib_files%),resul
t_title%(max_lib_files%)
460 DIM result_open%(max_lib_files%)
470 lib_files%=0
480 lib_sprite_size%=16
490 PROCfind_procedures(library$)
500 DIM lib_sprites% lib_sprite_size%
510 !lib_sprites%=lib_sprite_size%
520 lib_sprites%!4=0
530 lib_sprites%!8=16
540 lib_sprites%!12=16
550 PROCload_data(library$)
560 OVERLAY lib_file$()
570 PROCinit_procedures
580 SYS "Wimp_OpenTemplate",,"<Bio$Dir
>.Templates"
590 FOR i%=1 TO lib_files%
600 IF (lib_flags%(i%) AND 8)>0 THEN
610 SYS "Wimp_LoadTemplate",,q%,ind%,i
nd_end%,-1,"result" TO ,,ind%
620 q%!4+=RND(400)-200
630 q%!16+=RND(400)-200
640 result_title%(i%)=q%!72
650 SYS "Wimp_CreateWindow",,q% TO res
ult_hand%(i%)
660 ENDIF
670 NEXT
680 SYS "Wimp_LoadTemplate",,q%,ind%,i
nd_end%,-1,"progInfo" TO ,,ind%
690 SYS "Wimp_CreateWindow",,q% TO inf
o_hand%
700 SYS "Wimp_LoadTemplate",,q%,ind%,i
nd_end%,-1,"save" TO ,,ind%
710 SYS "Wimp_CreateWindow",,q% TO sav
e_hand%
720 SYS "Wimp_CloseTemplate"
730 savetext=FNic_addr(save_hand%,2,28
)
740 savetype=FNic_addr(save_hand%,1,32
)
750 $savetext="Result"
760 menuptr%=menubuf%
770 menudat%=menubuf%+&300
780 proc_menu%=FNmake_men_raw(pmenu%,"
Process")
790 main_menu%=FNmake_men("Info,Proces
s,Set default,Quit,","Bio")
800 all_menu%=FNmake_men("All,","Quit"
)
810 PROCattach_sub_menu(info_hand%,mai
n_menu%,0)
820 PROCattach_sub_menu(proc_menu%,mai
n_menu%,1)
830 PROCattach_sub_menu(all_menu%,main
_menu%,3)
840 cur_setup_hand%=-1
850 ENDPROC
860 :
870 DEF PROCfind_procedures(dir$)
880 LOCAL n%,r%
890 n%=0
900 WHILE n%<>-1
910 SYS "OS_GBPB",10,dir$,temp%,1,n%,&
100,"*" TO ,,,r%,n%
```

```
920 IF r%=1 THEN
930 file$=FNget_str(temp%+20)
940 IF temp%!16=2 THEN
950 PROCfind_procedures(dir$+"."+file$
)
960 ELSE
970 CASE ((!temp%) AND &FFF00) DIV &10
0 OF
980 WHEN &FF9:
990 lib_sprite_size%+=temp%!8
1000 WHEN &FFB:
1010 lib_files%+=1
1020 lib_proc$(lib_files%)=FNlc(file$)
1030 lib_file$(lib_files%)=dir$+"."+fil
e$
1040 ENDCASE
1050 ENDIF
1060 ENDIF
1070 ENDWHILE
1080 ENDPROC
1090 :
1100 DEF PROCload_data(dir$)
1110 LOCAL n%,r%,file$
1120 n%=0
1130 WHILE n%<>-1
1140 SYS "OS_GBPB",10,dir$,temp%,1,n%,&
100,"*" TO ,,,r%,n%
1150 IF r%=1 THEN
1160 file$=FNget_str(temp%+20)
1170 IF temp%!16=2 THEN
1180 PROCload_data(dir$+"."+file$)
1190 ELSE
1200 CASE ((!temp%) AND &FFF00) DIV &10
0 OF
1210 WHEN &FF9:
1220 SYS "OS_SpriteOp",&10B,lib_sprites
%,dir$+"."+file$
1230 WHEN &FEC:
1240 SYS "Wimp_OpenTemplate",,dir$+"."+
file$
1250 wind%=0
1260 REPEAT
1270 $_star%="*"
1280 SYS "Wimp_LoadTemplate",,q%,ind%,i
nd_end%,-1,_star%,wind% TO ,,newind%,,,,
wind%
1290 IF wind%<>0 THEN
1300 proc%=FNfind_proc(FNlc(FNget_str(_
star%)))
1310 IF proc%>0 THEN
1320 ind%=newind%
1330 SYS "Wimp_CreateWindow",,q% TO win
d_hand%(proc%)
1340 wind%=0
1350 ENDIF
1360 ENDIF
1370 UNTIL wind%=0
1380 SYS "Wimp_CloseTemplate"
1390 ENDCASE
1400 ENDIF
1410 ENDIF
1420 ENDWHILE
1430 ENDPROC
1440 :
1450 DEF FNfind_proc(proc$)
1460 LOCAL i%
1470 i%=lib_files%+1
1480 REPEAT
1490 i%-=1
1500 UNTIL i%=0 OR proc$=lib_proc$(i%)
1510 =i%
1520 :
1530 DEF FNfind_elem(e%,a%())
1540 LOCAL i%
1550 i%=lib_files%+1
1560 REPEAT
1570 i%-=1
1580 UNTIL i%=0 OR e%=a%(i%)
1590 =i%
1600 :
1610 DEF PROCinit_procedures
1620 DIM lib_spr%(lib_files%,1),pmenu%
&400
1630 lib_spr%(0,0)=FNsprite_address("Bi
o4")
1640 lib_spr%(0,1)=FNsprite_address("Bi
o2")
1650 pmp%=pmenu%
1660 FOR i%=1 TO lib_files%
1670 lib_spr%(i%,0)=FNsprite_address(li
b_proc$(i%)+"4")
1680 lib_spr%(i%,1)=FNsprite_address(li
b_proc$(i%)+"2")
1690 lib_name$(i%)=EVAL("FN"+lib_proc$(
i%)+"_name")
1700 type$=EVAL("FN"+lib_proc$(i%)+"_ar
gs")
1710 SYS "OS_ReadArgs",type_def$,type$,
q%,&400
1720 files_in%=(q%!0<>0)
1730 is_out%=(q%!4<>0)
1740 dirs_in%=(q%!8<>0)
1750 send_out%=(q%!12<>0)
1760 files_out%=FALSE
1770 data_out%=FALSE
1780 IF files_in% lib_in%(i%)=FNfile_ty
pe(FNget_str(q%!0))
1790 IF is_out% THEN
1800 out$=FNget_str(q%!4)
1810 IF STR$VALout$=out$ THEN
1820 lib_out%(i%)=VALout$
1830 data_out%=TRUE
1840 ELSE
1850 lib_out%(i%)=FNfile_type(out$)
1860 files_out%=TRUE
1870 ENDIF
1880 ENDIF
1890 lib_flags%(i%)=(files_in% AND 1) O
R (dirs_in% AND 2) OR (files_out% AND 4)
 OR (data_out% AND 8) OR (send_out% AND
16)
1900 wind_hand%=wind_hand%(i%)
1910 z=EVAL("FN"+lib_proc$(i%)+"_init")
1920 $pmp%=lib_name$(i%)+","
1930 pmp%+=LEN($pmp%)
1940 NEXT
1950 ENDPROC
1960 :
1970 DEF FNsprite_address(spr$)
1980 SYS "XOS_SpriteOp",&118,lib_sprite
s%,spr$ TO ,,addr%;ok
1990 IF (ok AND 1)>0 addr%=0
2000 =addr%
2010 :
2020 DEF PROCinit_sel
2030 in%=OPENIN("<Bio$Dir>.!Choices")
2040 running%=0
2050 IF in%<>0 THEN
2060 WHILE NOT EOF#in%
2070 proc%=FNfind_proc(FNlc(GET$#in%))
2080 IF proc%>0 PROCstart_proc(proc%):r
unning%+=1:running%(running%)=proc%
2090 ENDWHILE
2100 CLOSE #in%
2110 ENDIF
2120 IF running%=0 PROCstart_proc(0)
2130 ENDPROC
2140 :
2150 DEF PROCstart_proc(proc%)
2160 !ic%=-1
2170 IF FNmv(5)=1 AND lib_spr%(proc%,1)
<>0 icon%=1 ELSE icon%=0
2180 ic%!4=0
2190 ic%!8=0
2200 ic%!12=68
2210 ic%!16=68
2220 ic%!20=&7000311A
2230 ic%!24=lib_spr%(proc%,icon%)
2240 ic%!28=lib_sprites%
2250 ic%!32=0
2260 SYS "Wimp_CreateIcon",,ic% TO proc
_icon%(proc%)
2270 ENDPROC
2280 :
2290 DEF PROCselect_proc(proc%,but%)
2300 IF proc_icon%(proc%)>0 THEN
2310 PROCkill_proc(proc%)
2320 ELSE
2330 IF running%=0 PROCdelete_icon(proc
_icon%(0))
2340 PROCstart_proc(proc%) : REM if but
 AND 4 replace the old one...
2350 running%+=1
2360 running%(running%)=proc%
2370 ENDIF
2380 ENDPROC
2390 :
2400 DEF PROCkill_proc(proc%)
2410 PROCdelete_icon(proc_icon%(proc%))
2420 proc_icon%(proc%)=0
2430 IF cur_setup_hand%=wind_hand%(proc
%) PROCclose(cur_setup_hand%)
2440 IF result_open%(proc%) PROCclose(r
esult_hand%(proc%))
2450 run_pos%=FNfind_elem(proc%,running
%())
2460 running%(run_pos%)=0
2470 WHILE run_pos%<running%
2480 running%(run_pos%)=running%(run_po
s%+1)
2490 run_pos%+=1
2500 ENDWHILE
2510 running%-=1
2520 IF running%=0 PROCstart_proc(0)
2530 ENDPROC
2540 :
2550 DEF PROCdelete_icon(ic%!4)
2560 !ic%=-1
2570 SYS "Wimp_DeleteIcon",,ic%
2580 ENDPROC
2590 :
2600 DEF FNleaf_name(s$)
2610 WHILE INSTR(s$,".")>0
2620 s$=MID$(s$,INSTR(s$,".")+1)
2630 ENDWHILE
2640 =s$
2650 :
2660 DEF FNget_str(a%)
2670 LOCAL a$
2680 WHILE ?a%>=32
2690 a$=a$+CHR$?a%
2700 a%+=1
2710 ENDWHILE
2720 =a$
2730 :
2740 DEF FNmake_men($temp%,menutitle$)
2750 =FNmake_men_raw(temp%,menutitle$)
2760 :
2770 DEF FNmake_men_raw(mp%,menutitle$)
2780 LOCAL menumax%,wasptr%,item$
2790 wasptr%=menuptr%
2800 menumax%=0
2810 menuptr%!20=44
2820 $menuptr%=menutitle$
2830 menuptr%!12=&70207
2840 maxaddr%=menuptr%+16
2850 menuptr%!24=0
2860 menuptr%+=28
2870 REPEAT
2880 item$=""
2890 WHILE ?mp%<>44
2900 item$+=CHR$?mp%
2910 mp%+=1
2920 ENDWHILE
2930 mp%+=1
2940 IF LEN(item$)>menumax% menumax%=LE
N(item$)
2950 menuptr%!0=0
2960 menuptr%!4=-1
2970 menuptr%!8=&7000021
2980 IF LEN(item$)<12 THEN
2990 $(menuptr%+12)=item$
3000 ELSE
3010 menudat%-=LEN(item$)+1
3020 $menudat%=item$
3030 menuptr%!12=menudat%
3040 menuptr%!16=-1
3050 menuptr%!20=LEN(item$)
3060 menuptr%!8+=&100
3070 ENDIF
3080 menuptr%+=24
3090 UNTIL ?mp%<32
3100 menuptr%!-24=(menuptr%!-24) OR &80
3110 !maxaddr%=menumax%*16+32
3120 =wasptr%
3130 :
3140 DEF PROCattach_sub_menu(m1%,m2%,i%
)
3150 m2%!(32+24*i%)=m1%
3160 ENDPROC
3170 :
3180 DEF PROCopen_menu(m%,x%,y%)
3190 LOCAL i%
3200 FOR i%=1 TO lib_files%
3210 PROCtick(proc_menu%,i%-1,proc_icon
%(i%)>0)
3220 NEXT
3230 menux%=x%
3240 menuy%=y%
3250 SYS "Wimp_CreateMenu",,m%,x%,y%
3260 ENDPROC
3270 :
3280 DEF PROCmenu_select
3290 SYS "Wimp_GetPointerInfo",,temp%
3300 redo%=((temp%!8) AND 1)>0
3310 CASE !q% OF
3320 WHEN 1:IF q%!4>=0 PROCselect_proc(
q%!4+1,temp%!8)
3330 WHEN 2:PROCset_default
3340 WHEN 3:redo%=FALSE:IF q%!4>=0 OR r
unning%=0 done%=TRUE ELSE PROCkill_proc(
bar_proc%)
3350 ENDCASE
3360 IF redo% PROCopen_menu(main_menu%,
menux%,menuy%)
3370 ENDPROC
3380 :
3390 DEF PROCset_default
3400 LOCAL out%
3410 out%=OPENOUT("<Bio$Dir>.!Choices")
3420 IF running%>0 THEN
3430 FOR i%=1 TO running%
3440 PROCbput(out%,lib_proc$(running%(i
%)))
3450 NEXT
3460 ENDIF
3470 CLOSE #out%
3480 ENDPROC
3490 :
3500 DEF PROCtick(a%,i%,c%)
3510 a%=a%+28+24*i%
3520 IF c% THEN !a%=!a% OR 1 ELSE !a%=!
a% AND &FFFFFFFE
3530 ENDPROC
3540 :
3550 DEF PROCwarn(w$)
3560 !temp%=17
3570 $(temp%+4)=w$
3580 SYS "Wimp_ReportError",temp%,1,"Bi
o"
3590 ENDPROC
3600 :
3610 DEF PROCmouse(mousex%,mousey%,b%,h
andle%,icon%)
3620 LOCAL shand%,proc%
3630 bar_proc%=FNfind_elem(icon%,proc_i
con%())
3640 IF (b% AND 5)>0 THEN
3650 CASE handle% OF
3660 WHEN save_hand%:
3670 CASE icon% OF
3680 WHEN 0:IF FNsave(FNget_str(savetex
t)) PROCclose(save_hand%)
3690 WHEN 1:PROCinit_save_drag(save_han
d%)
3700 ENDCASE
3710 WHEN -2:
3720 shand%=wind_hand%(bar_proc%)
3730 IF shand%>0 THEN
3740 IF cur_setup_hand%<>-1 PROCclose(c
ur_setup_hand%)
3750 cur_setup_hand%=shand%
3760 !q%=shand%
3770 SYS "Wimp_GetWindowState",,q%
3780 q%!28=-1
3790 SYS "Wimp_OpenWindow",,q%
3800 ENDIF
3810 OTHERWISE:
3820 proc%=FNfind_elem(handle%,wind_han
d%())
3830 IF proc%>0 THEN
3840 e=EVAL("FN"+lib_proc$(proc%)+"_mou
se("+STR$mousex%+","+STR$mousey%+","+STR
$b%+","+STR$handle%+","+STR$icon%+")")
3850 IF e PROCprocess(proc%,"")
3860 ENDIF
3870 ENDCASE
3880 ELSE
3890 IF (b% AND 2)>0 AND handle%=-2 THE
N
3900 IF bar_proc%=0 PROClabel_main("Bio
") ELSE PROClabel_main(FNleaf_name(lib_f
ile$(bar_proc%)))
3910 PROCopen_menu(main_menu%,mousex%-6
4,272)
3920 ENDIF
3930 ENDIF
3940 ENDPROC
3950 :
3960 DEF PROClabel_main(title$)
3970 FOR i%=0 TO LENtitle$
3980 main_menu%?i%=ASCMID$(title$+CHR$0
,i%+1,1)
3990 NEXT
4000 ENDPROC
4010 :
4020 DEF FNfile_type(name$)
4030 LOCAL type%,ok
4040 IF name$="*" THEN =-1
4050 SYS "XOS_FSControl",31,name$ TO ,,
type%;ok
4060 IF (ok AND 1)>0 PROCwarn("Unknown
file type '"+name$+"'")
4070 =type%
4080 :
4090 DEF PROCmessage
4100 LOCAL proc%
4110 PROCcopy(q%,mess%,&100)
4120 CASE mess%!16 OF
4130 WHEN 0:done%=TRUE
4140 WHEN 1:
4150 cur_proc%=FNwhich_proc
4160 IF FNallow_type(mess%!40,cur_proc%
) THEN
4170 mess%!36=-1
4180 $(mess%+44)="<Wimp$Scrap>"+CHR$0
4190 mess%!12=mess%!8
4200 mess%!16=2
4210 !mess%=60
4220 SYS "Wimp_SendMessage",17,mess%,me
ss%!4
4230 ELSE
4240 PROCbad_file_type
4250 ENDIF
4260 WHEN 2:
4270 IF FNsave(FNget_str(mess%+44)) THE
N
4280 mess%!12=mess%!8
4290 mess%!16=3
4300 SYS "Wimp_SendMessage",17,mess%,me
ss%!4
4310 PROCclose(save_hand%)
4320 ENDIF
4330 WHEN 3:
4340 proc%=FNwhich_proc
4350 IF FNallow_type(mess%!40,proc%) TH
EN
4360 PROCprocess(proc%,FNget_str(mess%+
44))
4370 mess%!12=mess%!8
4380 mess%!16=4
4390 SYS "Wimp_SendMessage",17,mess%,me
ss%!4
4400 ELSE
4410 PROCbad_file_type
4420 ENDIF
4430 ENDCASE
4440 ENDPROC
4450 :
4460 DEF PROCbad_file_type
4470 PROCwarn("Invalid file type")
4480 ENDPROC
4490 :
4500 DEF FNwhich_proc
4510 SYS "Wimp_GetPointerInfo",,ic%
4520 IF ic%!12=-2 THEN =FNfind_elem(ic%
!16,proc_icon%())
4530 =FNfind_elem(ic%!12,wind_hand%())
4540 :
4550 DEF FNallow_type(given%,proc%)
4560 IF (given%=&1000 OR given%=&2000)
THEN =(lib_flags%(proc%) AND 2)<>0
4570 IF (lib_flags%(proc%) AND 1) AND (
lib_in%(proc%)=-1 OR lib_in%(proc%)=give
n%) THEN =TRUE
4580 =FALSE
4590 :
4600 DEF PROCcopy(from%,to%,bytes%)
4610 LOCAL i%
4620 FOR i%=0 TO bytes%-1 STEP 4
4630 to%!i%=from%!i%
4640 NEXT
4650 ENDPROC
4660 :
4670 DEF PROCprocess(proc%,file$)
4680 LOCAL e$,z,x,y,b,i%
4690 cur_proc%=proc%
4700 IF cur_setup_hand%<>-1 PROCclose(c
ur_setup_hand%)
4710 MOUSE x,y,b
4720 e$="FN"+lib_proc$(proc%)+"("""+fil
e$+""""
4730 makes_file%=(lib_flags%(proc%) AND
 4)>0
4740 makes_results%=(lib_flags%(proc%)
AND 8)>0
4750 send_out%=(lib_flags%(proc%) AND 1
6)>0
4760 CASE TRUE OF
4770 WHEN makes_file%:
4780 e$+=","""+junk$+""""
4790 WHEN makes_results%:
4800 FOR i%=0 TO lib_out%(proc%)
4810 e$+=",r$("+STR$proc%+","+STR$i%+")
"
4820 NEXT
4830 ENDCASE
4840 e$+=")"
4850 SYS "Hourglass_On"
4860 wind_hand%=wind_hand%(proc%)
4870 z=EVAL(e$)
4880 SYS "Hourglass_Off"
4890 IF z=0 THEN
4900 CASE TRUE OF
4910 WHEN makes_results%:
4920 IF r$(proc%,0)="" OR LEFT$(r$(proc
%,0),1)="<" r$(proc%,0)="Results"
4930 PROCopen_result(proc%)
4940 WHEN makes_file%:
4950 SYS "OS_File",18,junk$,lib_out%(pr
oc%)
4960 IF send_out% THEN
4970 $q%=STRING$(44,CHR$0)+junk$
4980 q%!16=5
4990 q%!40=lib_out%(proc%)
5000 !q%=((LEN(junk$)+4) AND NOT 3)+44
5010 SYS "Wimp_SendMessage",18,q%,0
5020 ELSE
5030 PROCopen_save(x-64,y-64,lib_out%(p
roc%))
5040 ENDIF
5050 ENDCASE
5060 ENDIF
5070 ENDPROC
5080 :
5090 DEF PROCpop_up_save
5100 LOCAL x,y,b
5110 MOUSE x,y,b
5120 PROCopen_save(x-64,y-64,lib_out%(c
ur_proc%))
5130 ENDPROC
5140 :
5150 DEF PROCopen_result(proc%)
5160 LOCAL i%,maxw%
5170 IF result_open%(proc%) PROCclose(r
esult_hand%(proc%))
5180 $result_title%(proc%)=r$(proc%,0)
5190 maxw%=0
5200 FOR i%=0 TO lib_out%(proc%)
5210 IF LEN(r$(proc%,i%))>maxw% maxw%=L
EN(r$(proc%,i%))
5220 NEXT
5230 !q%=0
5240 q%!4=-(2*border%+40*lib_out%(proc%
))
5250 q%!8=16*maxw%+2*border%
```

```
5260 q%!12=0
5270 SYS "Wimp_SetExtent",result_hand%(proc%),q%
5280 !q%=result_hand%(proc%)
5290 SYS "Wimp_GetWindowState",,q%
5300 q%!12=q%!4+16*maxw%+2*border%
5310 q%!8=q%!16-(2*border%+40*lib_out%(proc%))
5320 q%!28=-1
5330 SYS "Wimp_OpenWindow",,q%
5340 result_open%(proc%)=TRUE
5350 ENDPROC
5360 :
5370 DEF PROCopen_save(x%,y%,type%)
5380 LOCAL w%,h%
5390 $savetype="Sfile_"+RIGHT$("FF"+STR$~type%,3)
5400 !q%=save_hand%
5410 SYS "Wimp_GetWindowInfo",,q%
5420 w%=q%!12-q%!4
5430 h%=q%!16-q%!8
5440 q%!4=x%
5450 q%!8=y%
5460 q%!12=x%+w%
5470 q%!16=y%+h%
5480 q%!20=0
5490 q%!24=0
5500 q%!28=-1
5510 SYS "Wimp_OpenWindow",,q%
5520 ENDPROC
5530 :
5540 DEF PROCdrag
5550 SYS "Wimp_GetPointerInfo",,q%
5560 q%!32=q%!4:q%!28=!q%
5570 q%!24=q%!16:q%!20=q%!12
5580 q%!16=1:q%!12=0
5590 SYS "OS_File",5,junk$ TO ,,q%!40,,q%!36
5600 q%!40=(q%!40 AND &FFF00) DIV &100
5610 $(q%+44)=FNleaf_name(FNget_str(savetext))+CHR$(0)
5620 !q%=60
5630 SYS "Wimp_SendMessage",17,q%,q%!20,q%!24
5640 ENDPROC
5650 :
5660 DEF PROCkey(hand%,icon%,xcar%,ycar%,carh%,carpos%,key%)
5670 LOCAL proc%
5680 IF hand%=save_hand% AND key%=13 THEN
5690 IF FNsave(FNget_str(savetext)) PROCclose(save_hand%)
5700 ELSE
5710 proc%=FNfind_elem(hand%,wind_hand%())
5720 IF proc%=0 THEN
5730 SYS "Wimp_ProcessKey",key%
5740 ELSE
5750 e=EVAL("FN"+lib_proc$(proc%)+"_key("+STR$hand%+","+STR$icon%+","+STR$xcar%+","+STR$ycar%+","+STR$carh%+","+STR$carpos%+","+STR$key%+")")
5760 IF e PROCprocess(proc%,"")
5770 ENDIF
5780 ENDIF
5790 ENDPROC
5800 :
5810 DEF PROCinit_save_drag(save_hand%)
5820 LOCAL x%,y%,ysize%
5830 !q%=save_hand%
5840 SYS "Wimp_GetWindowState",,q%
5850 ysize%=q%!16-q%!8
5860 x%=q%!4
5870 y%=q%!8
5880 q%!4=1
5890 SYS "Wimp_GetIconState",,q%
5900 q%!8+=x%
5910 q%!12+=y%+ysize%
5920 q%!16+=x%
5930 q%!20+=y%+ysize%
5940 q%!24=0
5950 q%!28=0
5960 q%!32=(FNmv(11)+1)<<FNmv(4)
5970 q%!36=(FNmv(12)+1)<<FNmv(5)
5980 !q%=0
5990 q%!4=5
6000 SYS "Wimp_DragBox",,q%
6010 ENDPROC
6020 :
6030 DEF FNmv(m%)
6040 LOCAL v%
6050 SYS "OS_ReadModeVariable",-1,m% TO ,,v%
6060 =v%
6070 :
6080 DEF FNsave(save$)
6090 LOCAL saved%
6100 IF FNgood_save_name(save$) THEN
6110 SYS "OS_FSControl",26,junk$,save$,&82
6120 saved%=TRUE
6130 ELSE
6140 PROCwarn("To save, drag the icon to a directory viewer.")
6150 saved%=FALSE
6160 ENDIF
6170 =saved%
6180 :
6190 DEF FNgood_save_name(save$)
6200 =save$="<Wimp$Scrap>" OR INSTR(save$,":")>0 OR INSTR(save$,".")>0
6210 :
6220 DEF FNic_addr(hand%,icon%,off%)
6230 !ic%=hand%
6240 ic%!4=icon%
6250 SYS "Wimp_GetIconState",,ic%
6260 =ic%!off%
6270 :
6280 DEF PROCclose(hand%)
6290 LOCAL proc%
6300 !q%=hand%
6310 SYS "Wimp_CloseWindow",,q%
6320 IF hand%=save_hand% SYS "XOS_File",6,junk$
6330 IF hand%=cur_setup_hand% THEN cur_setup_hand%=-1
6340 proc%=FNfind_elem(hand%,result_hand%())
6350 IF proc%>0 result_open%(proc%)=FALSE
6360 ENDPROC
6370 :
6380 DEF PROCredraw(hand%)
6390 LOCAL i%,more%,ax0%,ay0%,proc%
6400 proc%=FNfind_elem(hand%,result_hand%())
6410 SYS "Wimp_RedrawWindow",,q% TO more%
6420 WHILE more%
6430 ax0%=q%!4-q%!20
6440 ay0%=q%!16-q%!24
6450 FOR i%=1 TO lib_out%(proc%)
6460 MOVE ax0%+border%,ay0%-8-border%-40*(i%-1)
6470 PRINT r$(proc%,i%)
6480 NEXT
6490 SYS "Wimp_GetRectangle",,q% TO more%
6500 ENDWHILE
6510 ENDPROC
6520 :
6530 DEF FNuc(a$)
6540 LOCAL i%,c$
6550 FOR i%=1 TO LEN(a$)
6560 c$=MID$(a$,i%,1)
6570 IF c$>="a" AND c$<="z" MID$(a$,i%,1)=CHR$(ASCc$-32)
6580 NEXT
6590 =a$
6600 :
6610 DEF FNlc(a$)
6620 LOCAL i%
6630 FOR i%=1 TO LEN(a$)
6640 c$=MID$(a$,i%,1)
6650 IF c$>="A" AND c$<="Z" MID$(a$,i%,1)=CHR$(ASCc$+32)
6660 NEXT
6670 =a$
6680 :
6690 DEF FNstrip_spaces(str$)
6700 WHILE LEFT$(str$,1)=" "
6710 str$=MID$(str$,2)
6720 ENDWHILE
6730 WHILE RIGHT$(str$,1)=" "
6740 str$=LEFT$(str$)
6750 ENDWHILE
6760 =str$
6770 :
6780 DEF PROCbput(f%,str$)
6790 BPUT #f%,str$+CHR$10;
6800 ENDPROC
6810 :
6820 DEF PROCwput(f%,!_word%)
6830 SYS "OS_GBPB",2,f%,_word%,4
6840 ENDPROC
6850 :
6860 DEF FNwget(f%)
6870 SYS "OS_GBPB",4,f%,_word%,4
6880 =!_word%
6890 :
6900 DEF PROCwrite_in_icon(hand%,icon%,text$)
6910 $FNic_addr(hand%,icon%,28)=text$
6920 ic%!8=0:ic%!12=0
6930 SYS "Wimp_SetIconState",,ic%
6940 SYS "Wimp_GetCaretPosition",,ic%
6950 IF !ic%=hand% AND ic%!4=icon% SYS "Wimp_SetCaretPosition",!ic%,ic%!4,ic%!8,ic%!12,-1,-1
6960 ENDPROC
6970 :
6980 DEF FNicon_text(wind%,icon%)
6990 =$FNic_addr(wind%,icon%,28)
7000 :
7010 DEF PROCset_button(!ic%,ic%!4,state%)
7020 ic%!8=state%<<21
7030 ic%!12=1<<21
7040 SYS "Wimp_SetIconState",,ic%
7050 ENDPROC
7060 :
7070 DEF FNbutton_state(!ic%,ic%!4)
7080 SYS "Wimp_GetIconState",,ic%
7090 =SGN(ic%!(8+16) AND 1<<21)
7100 :
7110 DEF FNesg_state(wind%,esg%)
7120 SYS "Wimp_WhichIcon",wind%,ic%,%111111<<16,(esg%<<16) OR (1<<21)
7130 =!ic%
7140 :
7150 DEF PROChourglass(current,maximum)
7160 IF maximum<>0 SYS "Hourglass_Percentage",current*100/maximum
7170 ENDPROC
```

Listing 2 – Dat_Bio

```
10 REM >Dat_bio (Bio2)
20 REM Create files for !Bio
30 REM by Dave Acton & Dave Lawrence
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 free%=(HIMEM-END-&8000) AND &FFFFF000
80 DIM q% &100,w% free%
90 OSCLI"CDIR Library"
100 REPEAT
110 READ file$
120 IF file$<>"*" THEN
130 PRINT file$
140 READ type%,olen%
150 IF type%=&FFF OR type%=&FFE OR type%=&FEB THEN
160 out%=OPENOUT(file$)
170 REPEAT
180 READ line$
190 IF line$<>"*" BPUT#out%,line$
200 UNTIL line$="*"
210 CLOSE#out%
220 SYS "OS_File",18,file$,type%
230 ELSE
240 line%=0
250 d$=""
260 i%=0
270 WHILE i%<olen%
280 b$=FNc
290 IF b$>="a" AND b$<="z" THEN
300 off%=-EVAL("&"+FNc+FNc)
310 FOR k%=0 TO (ASC(b$)-ASC"a"+2)
320 w%?i%=w%?(i%+off%)
330 i%+=1
340 NEXT
350 ELSE
360 w%?i%=EVAL("&"+b$+FNc)
370 i%+=1
380 ENDIF
390 ENDWHILE
400 SYS "OS_File",10,file$,type%,,w%,w%+olen%
410 ENDIF
420 ENDIF
430 UNTIL file$="*"
440 END
450 :
460 DEF FNc
470 LOCAL c$
480 IF d$="" THEN
490 READ d$,ch$
500 line%+=1
510 $q%=d$
520 SYS "OS_CRC",0,q%,q%+LEN(d$),1 TO crc%
530 IF crc%<>EVAL("&"+ch$) PRINT"Error in data line ";line%:END
540 ENDIF
550 c$=LEFT$(d$,1)
560 d$=MID$(d$,2)
570 =c$
580 :
590 DATA "!Choices",&FFF,&1A
600 DATA tonedial
610 DATA summean
620 DATA drawsprs
630 DATA *
640 DATA "!Run",&FEB,&82
650 DATA Set Bio$Dir <Obey$Dir>
660 DATA Set Bio$Junk <Obey$Dir>.Junk
670 DATA IconSprites <Bio$Dir>.!Sprites
680 DATA wimpslot -min 96K -max 96K
690 DATA <Bio$Dir>.!RunImage
700 DATA *
710 DATA "!Sprites",&FF9,&324
720 DATA 0200000010a042803a09a0D,5E8C
730 DATA 2162696Fa13a16000004e1C,CCC7
740 DATA b1007a28ACa2Ca04000Cb21,B405
750 DATA FFFFFFa04FF00DDDDDDa04D,751A
760 DATA D00BBBBBBa04BB00999999a,EC48
770 DATA 049900777777a0477005555,BA0F
780 DATA 55a045500333333a0433f5C,158D
790 DATA 00004499a049900EEEE00a0,58C6
800 DATA 4a86CCa8Aa04DDa91a04a18,822B
810 DATA BBa1CBB00558800a04a70BB,D6B2
820 DATA a74a0400BBFFa04FFa5Fa62,A1B4
830 DATA 07D55D20DD6DAA6ADDDD0De,8BA
840 DATA A4000050a92A6AA77A7AAD6,4209
850 DATA 2DbB85555453423aA6A67Ab,5CF2
860 DATA 33AAD6c14a132202206DAA7,7D13
870 DATA 717011177A76AbE044a1322,8587
880 DATA 00D06D7A770100007177c14,F2A7
890 DATA 3322002202DDa61i2802008,62C3
900 DATA 82022D01508088aA5808820,41A5
910 DATA e78bC3002088888888888880,5D2D
920 DATA 8b3F6ADDb8B00888866FFFF,84A8
930 DATA 6F8688aA100a420070b14F6,7620
940 DATA 7FaCBFF8628D00D1001aC7b,55DC
950 DATA 14687F77373177776Fa4220,5663
960 DATA 1200004 0b28F67737010031,847B
970 DATA 77F7868808202222223343k14,B66
980 DATA 0210a134455k3Ca14a13c14,100F
990 DATA f64a8Eb9Ac7880d8C08aBAb,E77B
1000 DATA C87777aF018aFA736D21626,C7F7
1010 DATA 96Fc270002aF0d32000003a,B11C
1020 DATA FCACaECa04000CaF410FFFF,EA6C
1030 DATA FFa04FF10aCDa04DD10BBBB,26CB
1040 DATA BBa04BB10999999a049910a,34E8
1050 DATA D6a04771055555a0455103,E178
1060 DATA 33333a043310b3Cb4000449,384E
1070 DATA 9a049910EEEE00a04a14CCa,BEBF
1080 DATA 18a04DDa5Ca04a18BBa1CBB,D64
1090 DATA 10558800a04a70BBa74a040,647
1100 DATA 0BBFFa04FFaD1D73DADD5DD,753C
1110 DATA b9807213231AD6754A705b0,1077
1120 DATA C1322D1D537C0660Db18831,D86F
1130 DATA 0D2D35D67DDb0C00888F88D,FE34
1140 DATA D2DDA2DbD488687588F4152,749C
1150 DATA 10207aF474C520874812320,EE1C
1160 DATA Db0Ca18D83812d186586888,1F8A
1170 DATA 686707777a2400,A051
1180 DATA "Templates",&FEC,&334
1190 DATA FFFFFFFF00000000a04c075,713E
1200 DATA Ca0DC4a1101a15736176650,22D5
1210 DATA D1F8FE2811A00EB20a11B4a,DF51
1220 DATA 15b1870726F67496E666F0D,925E
1230 DATA 690000D402000060e307265,FD4A
1240 DATA 73756C740DBB0050A0E1b54,1FEB
1250 DATA A0a597Ca209Aa4D2403h663,4FB
1260 DATA 0070000520000786070207 01,5D6B
1270 DATA 0C0Ea41a8158a89FAe893Dc,1485
1280 DATA 25d84b9C53a882061733A0D,67E
1290 DATA 0D0D65b47C0aB160aB9EEaB,C4EF
1300 DATA 990aC13D9001C74F4B0D746,4BFB
1310 DATA 9746C65643E0DF656aD1A6a,12E6
1320 DATA D996aD9ECaE13B610017B8a,203C
1330 DATA E5B9aE90CaED0Ae40BAf40F,178
1340 DATA 10007C3aFFa83FFbF90D536,9815
1350 DATA 6696C655F6666660D0DD2aF,4F47
1360 DATA 8FCaE44E04aECiC44CaC412,B64B
1370 DATA 000384dC4b56aF2FCa4005e,F338
1380 DATA C4bBDiC478aCDb6013aEE09,10CB
1390 DATA aF2A4aF734aF454aD164bC4,751
1400 DATA 3000B70DhC4FE9AaFCCCaE4,B0AD
1410 DATA 76a7Ca57FF3D60000742494,7F78
1420 DATA F0D6950726F630D0000b209,5D73
1430 DATA 8e20C8bC46100078Be641Ba,F037
1440 DATA F8b40b58b4094e20A6e8428,E02
1450 DATA e2030e6060e40AFeA41EaE7,9B82
1460 DATA 3EaEBD0aB1b88F8aB919000,2EB8
1470 DATA 0174E616D653A0DdA00EaF2,6F6A
1480 DATA 9Ce20C4e20507572706F73a,94AD
1490 DATA 23aC0b4468e4090e4041757,1F2B
1500 DATA 4686F723A0Df4038e60b80b,D19
1510 DATA 6056657273696F6Ec404162,E7BF
1520 DATA 6F757420746869732070726,3DE2
1530 DATA F6772616D0D4D756C746970,5D0
1540 DATA d6420492F4Fb19636573736,92B5
1550 DATA F720D4443412026206 44C0D,BD53
1560 DATA 312E30300DC4aE8E0aE45A0,E83A
1570 DATA 40000CCaE0aEFb050038070,44CB
1580 DATA 000020001860702070103 01,E552
1590 DATA 0Cc1930aDDD0a18b263Da38,383D
1600 DATA 00300000b07b3658aFCaFBF,5C8B
1610 DATA F20e43526573a83730D,B765
1620 DATA "Library.BioSprites",&FF9,&20C
1630 DATA 0100000010a041002a09a04,A079
1640 DATA 62696F34a13a16000004e1C,48BD
1650 DATA b1007a28ACa2Ca04000Cb21,B405
1660 DATA FFFFFFa04FF00DDDDDDa04D,751A
1670 DATA D00BBBBBBa04BB00999999a,EC48
1680 DATA 049900777777a0477005555,BA0F
1690 DATA 55a045500333333a0433f5C,158D
1700 DATA 00004499a049900EEEE00a0,58C6
1710 DATA 4a86CCa8Aa04DDa91a04a18,822B
1720 DATA BBa1CBB00558800a04a70BB,D6B2
1730 DATA a74a0400BBFFa04FFa5Fa62,A1B4
1740 DATA 07D55D20DD6DAA6ADDDD0De,8BA
1750 DATA A4000050a92A6AA77A7AAD6,4209
1760 DATA 2DbB85555453423aA6A67Ab,5CF2
1770 DATA 33AAD6c14a132202206DAA7,7D13
1780 DATA 717011177A76AbE044a1322,8587
1790 DATA 00D06D7A770100007177c14,F2A7
1800 DATA 3322002202DDa61i2802008,62C3
1810 DATA 82022D01508088aA5808820,41A5
1820 DATA e78bC3002088888888888880,5D2D
1830 DATA 8b3F6ADDb8B00888866FFFF,84A8
1840 DATA 6F8688aA100a420070b14F6,7620
1850 DATA 7FaCBFF8628D00D1001aC7b,55DC
1860 DATA 14687F77373177776Fa4220,5663
1870 DATA 1200004 0b28F67737010031,847B
1880 DATA 77F7868808202222223343k14,B66
1890 DATA 0210a134455k3Ca14a13c14,100F
1900 DATA f64a8Eb9Ac7880d8C08aBAb,E77B
1910 DATA C87777000000,9149
1920 DATA *
```

Listing 3 – SumMean

```
10 REM >SumMean (Bio3)
20 REM Calculate sum and mean
30 END
40 :
50 DEF FNsummean_name="Total and Average"
60 DEF FNsummean_args="-in Text -results 3"
70 DEF FNsummean_init
80 =0
90 :
100 DEF FNsummean(in$,RETURN title$,RETURN s1$,RETURN s2$,RETURN s3$)
110 LOCAL in%,items,s$,total,average
120 in%=OPENIN(in$)
130 WHILE NOT EOF#in%
140 PROChourglass(PTR#in%,EXT#in%)
150 s$=FNstrip_spaces(GET$#in%)
160 IF INSTR("0123456789+-.",LEFT$(s$,1))>0 AND s$<>"" THEN
170 items+=1
180 total+=VAL(s$)
190 ENDIF
200 ENDWHILE
210 CLOSE#in%
220 IF items>0 average=total/items
230 title$=FNleaf_name(in$)
240 s1$="Items: "+STR$(items)
250 s2$="Sum:   "+STR$(total)
260 s3$="Mean:  "+STR$(average)
270 =0
```

Listing 4 – Dat_Sum

```
10 REM >Dat_sum (Bio4)
20 REM Create sprites for Sum/Mean module
30 :
40 free%=(HIMEM-END-&8000) AND &FFFFF000
50 DIM q% &100,w% free%
60 REPEAT
70 READ file$
80 IF file$<>"*" THEN
90 PRINT file$
100 READ type%,olen%
110 IF type%=&FFF OR type%=&FFE OR type%=&FEB THEN
120 out%=OPENOUT(file$)
130 REPEAT
140 READ line$
150 IF line$<>"*" BPUT#out%,line$
160 UNTIL line$="*"
170 CLOSE#out%
180 SYS "OS_File",18,file$,type%
190 ELSE
200 line%=0
210 d$=""
220 i%=0
230 WHILE i%<olen%
240 b$=FNc
250 IF b$>="a" AND b$<="z" THEN
260 off%=-EVAL("&"+FNc+FNc)
270 FOR k%=0 TO (ASC(b$)-ASC"a"+2)
280 w%?i%=w%?(i%+off%)
290 i%+=1
300 NEXT
310 ELSE
320 w%?i%=EVAL("&"+b$+FNc)
330 i%+=1
340 ENDIF
350 ENDWHILE
360 SYS "OS_File",10,file$,type%,,w%,w%+olen%
370 ENDIF
380 ENDIF
390 UNTIL file$="*"
400 END
410 :
420 DEF FNc
430 LOCAL c$
440 IF d$="" THEN
450 READ d$,ch$
460 line%+=1
470 $q%=d$
480 SYS "OS_CRC",0,q%,q%+LEN(d$),1 TO crc%
490 IF crc%<>EVAL("&"+ch$) PRINT"Error in data line ";line%:END
```

```
500 ENDIF
510 c$=LEFT$(d$,1)
520 d$=MID$(d$,2)
530 =c$
540 :
550 DATA "Sprites",&FF9,&36Ø
560 DATA Ø1ØØØØØ1Øa046403ØØØ054,E6B6
570 DATA aØ473756D6D65616E34a17Ø,1913
580 DATA ØØ4e1CbØC07a28ACb15Ø2ØØ,9C23
590 DATA ØØØCb34FFFFFFaØ4FF1ØDDD,BBFF
600 DATA DDDaØ4DD1ØBBBBBBaØ4BB1Ø,4BØC
610 DATA 999999aØ4991Ø777777aØ47,11EE
620 DATA 71Ø555555aØ4551Ø333333a,61CB
630 DATA Ø433b6Cb7Ø1ØØØ4499aØ499,4D14
640 DATA 1ØEEEEØØaØ4a84CCa88aØ4D,5C26
650 DATA Da9ØaØ4a18BBa1CBB1Ø5588,4BA3
660 DATA ØØaØ4a7ØBBa74aØ4ØØBBFFa,DØØ8
670 DATA Ø4FFe97e9EdA553a6Ca6F55,B127
680 DATA 15i1D517757a7A437627j31,9Ø3B
690 DATA 7377aEEØØ2Ø26j453Ø7747b,43E5
700 DATA F413k597277j4Cd742Ø7667,E361
710 DATA Ø2o7E6177k61c9E1Ø75c67Ø,5D1
720 DATA Ø327777777737eB15Ø57Ø1d,13EØ
730 DATA 82a1523f28Ø4oCE62eC4426,A58C
740 DATA 5154176d6F3ØcAØØØa3F745,35CØ
750 DATA 74554c461Ø65c8A3ØØ5aAA6,F3B3
760 DATA 7c58ØØØØ71261111111111b,CD4A
770 DATA 5471e144Øb81b85Ø2523355,1BØ2
780 DATA 7733cE35355555555aØ446Ø,E4BB
790 DATA 174351Ø7526oE6fF7FFFFFF,6D4E
800 DATA FFaØ4FFFFq14j14a29ØFaFF,BBE1
810 DATA FØk14FØd37k28b52oEFa29b,CBBE
820 DATA 3Eo7Bw29k94FØp14e13mCBi,C8CE
830 DATA D3d6FeAFaBAg14e4DFØc14e,357Ø
840 DATA 95fF1i14aDBe14h8Bf27b14,713Ø
850 DATA cFBFFFFFF,8A9A
860 DATA *
```

Listing 5 – DrawSprs

```
10 REM >DrawSprs (Bio5)
20 REM Get sprites from drawfile
30 END
40 :
50 DEF FNdrawsprs_name="Extract sprit
es"
60 DEF FNdrawsprs_args="-in DrawFile
-out Sprite -send"
70 DEF FNdrawsprs_init
80 =Ø
90 :
100 DEF FNdrawsprs(in$,out$)
110 LOCAL in%,out%,obj%,len%,i%,sprite
s%
120 in%=OPENIN(in$)
130 out%=OPENOUT(out$)
140 PTR#in%=4Ø
150 PTR#out%=12
160 sprites%=Ø
170 WHILE NOT EOF#in%
180 IF PTR#in% MOD 1ØØ=Ø PROChourglass
(PTR#in%,EXT#in%)
190 obj%=FNwget(in%)
200 len%=FNwget(in%)
210 IF obj%<>5 THEN
220 PTR#in%=PTR#in%+len%-8
230 ELSE
240 PTR#in%=PTR#in%+16
250 FOR i%=1 TO len%-24
260 IF PTR#in% MOD 1ØØ=Ø PROChourglass
(PTR#in%,EXT#in%)
270 BPUT#out%,BGET#in%
280 NEXT
290 sprites%+=1
300 ENDIF
310 ENDWHILE
320 PTR#out%=Ø
330 PROCwput(out%,sprites%)
340 PROCwput(out%,16)
350 PROCwput(out%,EXT#out%+4)
360 CLOSE#in%
370 CLOSE#out%
380 =Ø
```

Listing 6 – DatDrwSpr

```
10 REM >Dat_drsp (Bio6)
20 REM Create sprites for DrawSpr mod
ule
30 :
40 free%=(HIMEM-END-&8ØØØ) AND &FFFFF
ØØØ
50 DIM q% &1ØØ,w% free%
60 REPEAT
70 READ file$
80 IF file$<>"*" THEN
90 PRINT file$
100 READ type%,olen%
110 IF type%=&FFF OR type%=&FFE OR typ
e%=&FEB THEN
120 out%=OPENOUT(file$)
130 REPEAT
140 READ line$
150 IF line$<>"*" BPUT#out%,line$
160 UNTIL line$="*"
170 CLOSE#out%
180 SYS "OS_File",18,file$,type%
190 ELSE
200 line%=Ø
210 d$=""
220 i%=Ø
230 WHILE i%<olen%
240 b$=FNc
250 IF b$>="a" AND b$<="z" THEN
260 off%=-EVAL("&"+FNc+FNc)
270 FOR k%=Ø TO (ASC(b$)-ASC"a"+2)
280 w%?i%=w%?(i%+off%)
290 i%+=1
300 NEXT
310 ELSE
320 w%?i%=EVAL("&"+b$+FNc)
330 i%+=1
340 ENDIF
350 ENDWHILE
360 SYS "OS_File",1Ø,file$,type%,,w%,w
%+olen%
370 ENDIF
380 ENDIF
390 UNTIL file$="*"
400 END
410 :
420 DEF FNc
430 LOCAL c$
440 IF d$="" THEN
450 READ d$,ch$
460 line%+=1
470 $q%=d$
480 SYS "OS_CRC",Ø,q%,q%+LEN(d$),1 TO
crc%
490 IF crc%<>EVAL("&"+ch$) PRINT"Error
 in data line ";line%:END
500 ENDIF
510 c$=LEFT$(d$,1)
520 d$=MID$(d$,2)
530 =c$
540 :
550 DATA "Sprites",&FF9,&2EØ
560 DATA Ø1ØØØØØ1Øa04E4Ø2ØØØØD4,527Ø
570 DATA aØ46472617773Ø7Ø27334a1,DØ15
580 DATA 8Ø4e1Ca23ØØØ7a282Ca2C8Ø,B4BB
590 DATA a31ØCa3477777777aØ47777,C259
600 DATA 414434333323ØØØØ444404Ø,FC85
610 DATA 7ØØBØØBb2A7771737774775,B36E
620 DATA 7Ø1g146464Ø47773a32b45a,6514
630 DATA 28B7BBBBØB4Ø7Ø7Ø4Øb1377,A4D8
640 DATA 77d14a6Ø7ØØØ474ØØ77477Ø,9562
650 DATA 5b5BØ7b5Ø87Ø8ØØ7Ø676766,97FC
660 DATA 777371Ø5a3Ea82b648ØØ87Ø,B8E3
670 DATA a8DØ774c14f3C88ØØ7ØØ4ØØ,B32Ø
680 DATA 7472b28aC8b8CgAØfA9aAØc,64F
690 DATA CB1133537699FFFFØFbC4f1,6172
700 DATA 4aEC72FFBFFFØØ5Ø77Ø7k14,DA33
710 DATA BFBBØBØØ7571m28EEØEØØ27,2F4F
720 DATA aE4j3CAAa141BØ3m14AAØØØ,4AØF
730 DATA ØB7ØBk6471AAØAØØØØ7B114,35EB
740 DATA 7ØiAØFFFFFFFFaØ4FFFFf95,A7AC
750 DATA g11b14dB4k14b31bC9m11c4,1CC3
760 DATA 1n13b56k5Øb5Fn64ØØØØFØn,E82
770 DATA 5Ør8Cq1FFØq33q14z28z5Øz,AA9F
780 DATA 64z8CFF,9BC4
790 DATA *
```

*INFO

Listing 1 – Stars

```
10 REM >Stars (Info1)
20 REM by Jan Vibe
30 REM for 32-bit machines
40 REM (c) BAU February 1993
50 :
60 MODE 12
70 OFF
80 DIM c%(15,3),lx%(5Ø,2),ly%(5Ø,2),p
ath% 5ØØ
90 FOR n%=1 TO 15
100 v%=127*(SINRAD(24*n%)+1)
110 c%(n%,1)=v%
120 c%(n%,2)=v%
130 c%(n%,3)=v%
140 NEXT
150 ti%=TIME
160 REPEAT
170 k%=RND(97)+31
180 f=256/k%
190 p%=2*(RND(13)+3)
200 d=36Ø/p%
210 ct%=Ø
220 REPEAT
230 px%=RND(128Ø)
240 py%=RND(1Ø24)
250 ct%+=1
260 PROCf
270 UNTIL POINT(px%,py%)=Ø OR ct%=1ØØØ
Ø
280 IF ct%=1ØØØØ CLS
290 px%=px%*f
300 py%=py%*f
310 vr%=RND(36Ø)
320 z1%=RND(3ØØ)+2ØØ
330 d1%=RND(2ØØ)+1ØØ
340 z2%=RND(32)+16
350 d2%=RND(4ØØ)+1ØØ
360 FOR n%=1 TO p%
370 PROCf
380 t=RAD(d*n%+vr%)
390 lx%(n%,1)=z1%*SIN(t)+px%
400 ly%(n%,1)=z1%*COS(t)+py%
410 SWAP z1%,d1%
420 lx%(n%,2)=z2%*SIN(t)+px%
430 ly%(n%,2)=z2%*COS(t)+py%
440 SWAP z2%,d2%
450 NEXT
460 c%=RND(15)
470 s%=RND(17)+7
480 FOR n%=Ø TO s%
490 n1%=s%-n%
500 GCOL (n%+c%) MOD 15+1
510 pp%=Ø
520 x%=(n1%*lx%(1,1)+n%*lx%(1,2))/s%
530 y%=(n1%*ly%(1,1)+n%*ly%(1,2))/s%
540 PROCm(x%,y%)
550 FOR i%=2 TO p%
560 PROCf
570 x%=(n1%*lx%(i%,1)+n%*lx%(i%,2))/s%
580 y%=(n1%*ly%(i%,1)+n%*ly%(i%,2))/s%
590 PROCd(x%,y%)
600 NEXT
610 PROCcl
620 PROCe
630 SYS "Draw_Fill",path%,Ø,Ø,Ø
640 NEXT
650 UNTIL FALSE
660 :
670 DEF PROCm(x%,y%)
680 x%=x%*k%
690 y%=y%*k%
700 path%!pp%=2
710 pp%+=4
720 path%!pp%=x%
730 pp%+=4
740 path%!pp%=y%
750 pp%+=4
760 ENDPROC
770 :
780 DEF PROCd(x%,y%)
790 x%=x%*k%
800 y%=y%*k%
810 path%!pp%=8
820 pp%+=4
830 path%!pp%=x%
840 pp%+=4
850 path%!pp%=y%
860 pp%+=4
870 ENDPROC
880 :
890 DEF PROCcl
900 path%!pp%=5
910 pp%+=4
920 ENDPROC
930 :
940 DEF PROCe
950 path%!pp%=Ø
960 pp%+=4
970 path%!pp%=pp%
980 ENDPROC
990 :
1000 DEF PROCf
1010 LOCAL n%,cs%
1020 IF TIME>ti% THEN
1030 IF RND(1)>Ø.9 THEN
1040 cs%=RND(3)
1050 FOR n%=1 TO 15
1060 c%(n%-1,cs%)=c%(n%,cs%)
1070 NEXT
1080 c%(15,cs%)=c%(Ø,cs%)
1090 ENDIF
1100 sh%=sh% MOD 15+1
1110 FOR n%=1 TO 15
1120 cs%=(n%+sh%) MOD 15+1
1130 COLOUR n%,c%(cs%,1),c%(cs%,2),c%(c
s%,3)
1140 NEXT
1150 ti%=TIME+5
1160 ENDIF
1170 ENDPROC
```

Listing 2 – SpiralTree

```
10 REM >SpiralTree (Info2)
20 REM by Jan Vibe
30 REM for 32-bit machines
40 REM (c) BAU February 1992
50 :
60 MODE 12
70 OFF
80 DIM p%(4,17),pt%(15,15),c%(15,3)
90 PROCinit
100 PROCtree(87Ø,216,235,Ø,64,RND(15))
110 REPEAT
120 PROCs
130 UNTIL FALSE
140 :
150 DEF PROCtree(x%,y%,z%,a%,r%,c%)
160 LOCAL x1%,y1%,c1%
170 x1%=x%+z%*SINRAD(a%)
180 y1%=y%+z%*COSRAD(a%)
190 PROCl(x%,y%,x1%,y1%,c%,c% MOD 15+1
,r%)
200 IF z%>8 THEN
210 PROCtree(x1%,y1%,z%/1.1,a%-36,r%/1
.1,c% MOD 15+1)
220 x1%=x1%+Ø.9*r%*SINRAD(a%+9Ø)
230 y1%=y1%+Ø.9*r%*COSRAD(a%+9Ø)
240 PROCtree(x1%,y1%,z%/2.3Ø,a%+9Ø,r%/
2.3Ø,c% MOD 15+1)
250 ENDIF
260 ENDPROC
270 :
280 DEF PROCl(x1%,y1%,x2%,y2%,c1%,c2%,
r%)
290 LOCAL d,d2,k,f,p%,pg%,np%,n%,px%,p
y%
300 p%=1
310 PROCc(c1%,c2%,p%)
320 IF r%<=1 LINE x1%-1,y1%,x2%-1,y2%:
LINE x1%+1,y1%,x2%+1,y2%:ENDPROC
330 d=SQR((x1%-x2%)^2+(y1%-y2%)^2)
340 np%=d/(r%/4)
350 IF d>=68 k=17:f=1 ELSE k=d/4:f=17/
k
360 d2=d/k
370 FOR n%=Ø TO np%
380 PROCs
390 px%=(x2%*n%+x1%*(np%-n%))/np%
400 py%=(y2%*n%+y1%*(np%-n%))/np%
410 pg%=p%
420 p%=SQR((x1%-px%)^2+(y1%-py%)^2)/d2
+1
430 IF p%<>pg% AND p%<=k PROCc(c1%,c2%
,p%*f)
440 CIRCLE FILL px%,py%,r%
450 NEXT
460 ENDPROC
470 :
480 DEF PROCc(c1%,c2%,l%)
490 LOCAL pc$(),c1$,c2$,cp$,htab$,b%,m
%,n%,s%
500 DIM pc$(8)
510 htab$="Ø123456789ABCDEF"
520 c1$=MID$(htab$,c1%+1,1)
530 c2$=MID$(htab$,c2%+1,1)
540 FOR n%=1 TO 4
550 s%=p%(n%,l%)
560 cp$=""
570 b%=1
580 FOR m%=1 TO 8
590 PROCs
600 IF (b% AND s%)=Ø cp$=cp$+c1$ ELSE
cp$=cp$+c2$
610 b%=2*b%
620 NEXT
630 pc$(n%)=cp$
640 pc$(n%+4)=cp$
650 NEXT
660 PROCpat(pc$())
670 ENDPROC
680 :
690 DEF PROCpat(pat$())
700 LOCAL n%,m%,v%()
710 DIM v%(8,8)
720 FOR m%=1 TO 8
730 FOR n%=1 TO 8
740 v%(m%,n%)=EVAL("&"+MID$(pat$(m%),n
%,1))
750 NEXT
760 NEXT
770 FOR n%=1 TO 4
780 PROCs
790 VDU 23,n%+1
800 FOR m%=1 TO 8
810 VDU pt%(v%(m%,2*n%-1),v%(m%,2*n%))
820 NEXT
830 NEXT
840 ENDPROC
850 :
860 DEF PROCs
870 LOCAL n%,cs%
880 IF TIME>ti% THEN
890 IF RND(1)>.9 THEN
900 cs%=RND(3)
910 FOR n%=1 TO 15
920 c%(n%-1,cs%)=c%(n%,cs%)
930 NEXT
940 c%(15,cs%)=c%(Ø,cs%)
950 ENDIF
960 sh%=sh% MOD 15+1
970 FOR n%=1 TO 15
980 cs%=(n%+sh%) MOD 15+1
990 COLOUR 16-n%,c%(cs%,1),c%(cs%,2),c
%(cs%,3)
1000 NEXT
1010 ti%=TIME+6
1020 ENDIF
1030 ENDPROC
1040 :
1050 DEF PROCinit
1060 LOCAL n%,v%,x%,y%,c1%,c2%
1070 FOR n%=1 TO 15
1080 v%=127*(SINRAD(24*n%)+1)
1090 c%(n%,1)=v%
1100 c%(n%,2)=v%
1110 c%(n%,3)=v%
1120 NEXT
1130 COLOUR Ø,128,128,128
1140 VDU 19,Ø,24,128,128,128
1150 FOR y%=1 TO 17
1160 FOR x%=1 TO 4
1170 READ p%(x%,y%)
1180 NEXT
1190 NEXT
1200 FOR y%=Ø TO 15
1210 FOR x%=Ø TO 15
1220 c1%=1
1230 c2%=1
1240 FOR n%=1 TO 4
1250 IF (c1% AND x%)<>Ø pt%(x%,y%)+=c2%
1260 c2%=c2%*2
1270 IF (c1% AND y%)<>Ø pt%(x%,y%)+=c2%
1280 c2%=c2%*2:c1%=c1%*2
1290 NEXT
1300 NEXT
1310 NEXT
1320 GCOL 8Ø,Ø
1330 ti%=TIME
1340 sh%=RND(15)
1350 ENDPROC
1360 :
1370 DATA Ø,Ø,Ø,Ø,128,Ø,8,Ø,136,Ø,136,Ø
,136,32,136,2,136,34,136,34
1380 DATA 168,34,138,34,17Ø,34,17Ø,34,1
7Ø,42,17Ø,162,17Ø,17Ø,17Ø,17Ø
1390 DATA 234,17Ø,174,17Ø,238,17Ø,238,1
7Ø,238,186,238,171,238,187
1400 DATA 238,187,238,251,238,191,238,2
55,238,255,254,255,239,255
1410 DATA 255,255,255,255
```

Listing 3 – Shade1

```
10 REM >Shade1 (Info3)
20 REM by P D McKenzie
30 REM for 8-bit machines
40 REM (c) BAU February 1993
50 :
60 MODE 1
70 n%=7
80 VDU 23;82Ø2;Ø;Ø;Ø;
90 VDU 19,1,1;Ø;19,2,4;Ø;
100 VDU 29,64Ø;512;
110 PRINTTAB(14,1Ø)"Please Wait"
120 PROCsetup
130 CLS
140 PROCdraw
150 PROCsave
160 CHAIN"Shade2"
170 END
180 :
190 DEF PROCsetup
200 DIM x%(2),y%(2),z%(2)
210 DIM dx%(n%,2),dy%(n%,2)
220 DIM an(n%,3),c%(n%)
230 DIM d%(n%,3)
240 lx=Ø:ly=Ø:lz=1ØØØ
250 ax=3Ø:ay=3Ø:az=Ø
260 cx=COSRAD(ax)
270 sx=SINRAD(ax)
280 cy=COSRAD(ay)
290 sy=SINRAD(ay)
300 cz=COSRAD(az)
310 sz=SINRAD(az)
320 mm=1
330 RESTORE
```

```
  340 FOR u=0 TO n%
  350 PRINTTAB(19,12);u
  360 FOR v=0 TO 2
  370 READ x%(v),y%(v),z%(v)
  380 x%(v)=x%(v)*mm
  390 y%(v)=y%(v)*mm
  400 z%(v)=z%(v)*mm
  410 PROCtrans(x%(v),y%(v),z%(v))
  420 x%(v)=x%
  430 y%(v)=y%
  440 z%(v)=z%
  450 m=-2000/(z%-2000)
  460 dx%(u,v)=x%*m
  470 dy%(u,v)=y%*m
  480 NEXT
  490 READ c%(u)
  500 PROCgetabcd(x%(0),y%(0),z%(0),x%(1),y%(1),z%(1),x%(2),y%(2),z%(2))
  510 d%(u,0)=a
  520 d%(u,1)=b
  530 d%(u,2)=c
  540 d%(u,3)=d
  550 an(u,0)=FNang(dx%(u,0),dy%(u,0),dx%(u,1),dy%(u,1))
  560 an(u,1)=FNang(dx%(u,0),dy%(u,0),dx%(u,2),dy%(u,2))
  570 an(u,2)=FNang(dx%(u,1),dy%(u,1),dx%(u,0),dy%(u,0))
  580 an(u,3)=FNang(dx%(u,1),dy%(u,1),dx%(u,2),dy%(u,2))
  590 NEXT
  600 ENDPROC
  610 :
  620 DEF PROCgetabcd(x1,y1,z1,x2,y2,z2,x3,y3,z3)
  630 xa=x1+x2:xb=x2+x3:xc=x3+x1
  640 ya=y1+y2:yb=y2+y3:yc=y3+y1
  650 za=z1+z2:zb=z2+z3:zc=z3+z1
  660 a=(y1-y2)*za+(y2-y3)*zb+(y3-y1)*zc
  670 b=(z1-z2)*xa+(z2-z3)*xb+(z3-z1)*xc
  680 c=(x1-x2)*ya+(x2-x3)*yb+(x3-x1)*yc
  690 d=-(a*x1+b*y1+c*z1)
  700 ENDPROC
  710 :
  720 DEF PROCtrans(xx%,yy%,zz%)
  730 x%=xx%:y%=yy%:z%=zz%
  740 IF ax<>0 THEN a%=FNrot(x%,z%,cx,sx):z%=FNrot(x%,-z%,sx,cy):x%=a%
  750 IF ay<>0 THEN a%=FNrot(y%,z%,cy,sy):z%=FNrot(y%,-z%,sy,cy):y%=a%
  760 IF az<>0 THEN a%=FNrot(x%,y%,cz,sz):y%=FNrot(z%,-y%,sz,cz):z%=a%
  770 ENDPROC
  780 :
  790 DEF FNrot(x%,y%,c,s)
  800 =c*x%-s*y%
  810 :
  820 DEF FNang(a,b,c,d)
  830 x=c-a
  840 y=d-b
  850 IF x>0 AND y>0 =DEGATN(y/x)
  860 IF x<0 AND y>0 =180+DEGATN(y/x)
  870 IF x<0 AND y<0 =180+DEGATN(y/x)
  880 IF x>0 AND y<0 =360+DEGATN(y/x)
  890 IF y>0 =90
  900 IF y<0 =270
  910 IF x<0 =180
  920 =0
  930 :
  940 DEF PROCdraw
  950 FOR u=0 TO n%
  960 FOR v=0 TO 3
  970 k=5
  980 IF v=0 THEN k=4
  990 IF v=3 THEN w=0 ELSE w=v
 1000 PLOT k,dx%(u,w),dy%(u,w)
 1010 NEXT
 1020 NEXT
 1030 ENDPROC
 1040 :
 1050 DEF PROCsave
 1060 out=OPENOUT("temp")
 1070 PRINT#out,n%
 1080 PRINT#out,lx,ly,lz
 1090 FOR u=0 TO n%
 1100 FOR v=0 TO 3
 1110 IF v<>3 PRINT#out,dx%(u,v),dy%(u,v)
 1120 PRINT#out,an(u,v),d%(u,v)
 1130 NEXT
 1140 PRINT#out,c%(u)
 1150 NEXT
 1160 CLOSE#out
 1170 ENDPROC
 1180 :
 1190 DATA -100,-100,100,-100,100,100,100,-100,100,1
 1200 DATA -100,100,100,100,100,100,100,-100,100,1
 1210 DATA -100,100,100,-100,100,-100,100,100,-100,1
 1220 DATA -100,100,100,100,100,100,100,100,-100,1
 1230 DATA 100,-100,100,100,100,100,100,100,-100,1
 1240 DATA 100,-100,100,100,-100,-100,100,100,-100,1
 1250 DATA -250,-100,250,-250,-100,-250,250,-100,250,2
 1260 DATA -250,-100,-250,250,-100,-250,250,-100,250,2
```

Listing 4 – Shade2

```
   10 REM >Shade2 (Info4)
   20 REM P D McKenzie
   30 REM for 8-bit machines
   40 REM (c) BAU February 1992
   50 :
   60 PROCload
   70 xs=-100:ys=-100:xe=100:ye=100
   80 REPEAT
   90 *FX 4,1
  100 REPEAT
  110  PROCsquare
  120  REPEAT UNTIL INKEY(0)<>-1
  130   PROCsquare
  140   IF INKEY(-82) THEN PROCsave
  150   IF INKEY(-98) THEN xs=xs-4:xe=xe-4
  160   IF INKEY(-67) THEN xs=xs+4:xe=xe+4
  170   IF INKEY(-73) THEN ys=ys+4:ye=ye+4
  180   IF INKEY(-105) THEN ys=ys-4:ye=ye-4
  190   IF INKEY(-58) THEN ye=ye+4
  200   IF INKEY(-42) THEN ye=ye-4
  210   IF INKEY(-26) THEN xe=xe-4
  220   IF INKEY(-122) THEN xe=xe+4
  230  UNTIL INKEY(-74)
  240  *FX 4
  250  PROCtrace(xs,ys,xe,ye)
  260 UNTIL FALSE
  270 END
  280 :
  290 DEF PROCsquare
  300 GCOL 4,7
  310 MOVE xs,ys
  320 DRAW xs,ye
  330 DRAW xe,ye
  340 DRAW xe,ys
  350 DRAW xs,ys
  360 ENDPROC
  370 :
  380 DEF FNang(a,b,c,d)
  390 LOCAL x,y
  400 x=c-a:y=d-b
  410 IF x>0 AND y>0 =DEGATN(y/x)
  420 IF x<0 AND y>0 =180+DEGATN(y/x)
  430 IF x<0 AND y<0 =180+DEGATN(y/x)
  440 IF x>0 AND y<0 =360+DEGATN(y/x)
  450 IF y>0 =90
  460 IF y<0 =270
  470 IF x<0 =180
  480 =0
  490 :
  500 DEF PROCsave
  510 OSCLI"SAVE "+f$+" FFFF3000 FFFF8000"
  520 ENDPROC
  530 :
  540 DEF PROCtrace(xs,ys,xe,ye)
  550 FOR y=ys TO ye STEP 4
  560  FOR x=xs TO xe STEP 4
  570   k=INKEY(1)
  580   IF k=83 THEN PROCsave
  590   IF k=66 THEN x=xe:y=ye:GOTO 890
  600   FOR u=0 TO n%
  610    c%(u)=0
  620    IF x<dx%(u,0) AND x<dx%(u,1) AND x<dx%(u,2) OR x>dx%(u,0) AND x>dx%(u,1) AND x>dx%(u,2) OR y>dy%(u,0) AND y>dy%(u,1) AND y>dy%(u,2) OR y<dy%(u,0) AND y<dy%(u,1) AND y<dy%(u,2) THEN 790
  630     qq=FNang(dx%(u,0),dy%(u,0),x,y)
  640     r=FNang(dx%(u,1),dy%(u,1),x,y)
  650     FOR v=0 TO 3 STEP 2
  660      IF v=0 THEN q=qq ELSE q=r
  670      d=an(u,v)-an(u,v+1)
  680      IF d<180 THEN 710
  690      IF q<=an(u,v+1) OR q>=an(u,v) THEN c%(u)=c%(u)+1
  700      GOTO 780
  710      IF d>-180 THEN 740
  720      IF q>=an(u,v+1) OR q<=an(u,v) THEN c%(u)=c%(u)+1
  730      GOTO 780
  740      IF d>0 THEN 770
  750      IF q>=an(u,v) AND q<=an(u,v+1) THEN c%(u)=c%(u)+1
  760      GOTO 780
  770      IF q>=an(u,v+1) AND q<=an(u,v) THEN c%(u)=c%(u)+1
  780     NEXT
  790    NEXT
  800    p=0
  810    oz=-1E26
  820    FOR u=0 TO n%
  830     IF c%(u)<2 THEN 860
  840     z=-(((d%(u,0)*x)+(d%(u,1)*y)+d%(u,3))/d%(u,2))
  850     IF z>=oz THEN oz=z:p=u
  860    NEXT
  870    IF p=0 AND oz=-1E26 THEN GCOL 0,0:PLOT 69,x,y:GOTO 890
  880    PROCcol(x,y,oz,p)
  890  NEXT
  900 NEXT
  910 ENDPROC
  920 :
  930 DEF FNray(x%,y%,z%)
  940 xd%=lx-x%
  950 yd%=ly-y%
  960 zd%=lz-z%
  970 a=SQR(xd%^2+yd%^2+zd%^2)
  980 i=DEGASN((xd%*d%(p,0)+yd%*d%(p,1)+zd%*d%(p,2))/(a*(SQR(d%(p,0)^2+d%(p,1)^2+d%(p,2)^2))))
  990 IF i<0 THEN i=-i
 1000 =i/4.5
 1010 :
 1020 DEF PROCcol(xx,yy,zz,p)
 1030 LOCAL x,y
 1040 c%=FNray(xx,yy,zz)
 1050 x=(xx/4) MOD 3
 1060 y=(yy/4) MOD 3
 1070 IF x<0 THEN x=3+x
 1080 IF y<0 THEN y=3+y
 1090 GCOL 0,col%(p)
 1100 PLOT 69,xx,yy
 1110 IF c%=10 THEN ENDPROC
 1120 IF c%<10 THEN GCOL 0,0:c%=11-c%
 1130 IF c%>10 THEN GCOL 0,7:c%=c%-9
 1140 IF c%>1 AND x=0 AND y=2 THEN PLOT 69,xx,yy
 1150 IF c%>2 AND x=2 AND y=0 THEN PLOT 69,xx,yy
 1160 IF c%>3 AND x=1 AND y=2 THEN PLOT 69,xx,yy
 1170 IF c%>4 AND x=2 AND y=1 THEN PLOT 69,xx,yy
 1180 IF c%>5 AND x=1 AND y=1 THEN PLOT 69,xx,yy
 1190 IF c%>6 AND x=0 AND y=0 THEN PLOT 69,xx,yy
 1200 IF c%>7 AND x=0 AND y=1 THEN PLOT 69,xx,yy
 1210 IF c%>8 AND x=2 AND y=2 THEN PLOT 69,xx,yy
 1220 IF c%>9 AND x=1 AND y=0 THEN PLOT 69,xx,yy
 1230 ENDPROC
 1240 :
 1250 DEF PROCload
 1260 in=OPENIN("temp")
 1270 INPUT#in,n%
 1280 DIM dx%(n%,2),dy%(n%,2)
 1290 DIM an(n%,3),col%(n%),c%(n%)
 1300 DIM d%(n%,3)
 1310 INPUT#in,lx,ly,lz
 1320 FOR u=0 TO n%
 1330  FOR v=0 TO 3
 1340   IF v<>3 INPUT#in,dx%(u,v),dy%(u,v)
 1350   INPUT#in,an(u,v),d%(u,v)
 1360  NEXT
 1370  INPUT#in,col%(u)
 1380 NEXT
 1390 CLOSE#in
 1400 f$="SCREEN"
 1410 ENDPROC
```

Listing 5 – Bang!

```
   10 REM >Bang! (Info5)
   20 REM by David Llewellyn-Jones
   30 REM (the Flying Pig)
   40 REM for 32-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 speed%=2<<16
   80 tracks%=8
   90 PRINTRND(-(TIME+1)*VALRIGHT$(TIME$,2))
  100 MODE 13
  110 PRINT"Compiling..."
  120 PROCass
  130 PRINT"Press a key..."
  140 k=GET
  150 CLS
  160 OFF
  170 CALL start
  180 END
  190 :
  200 DEF PROCass
  210 DIM code% 50000
  220 link=14:pc=15
  230 x=5:y=6:h=7:v=8
  240 track=9:base=10:temp=11:add=12
  250 count=1:point=2:key=3:top=4
  260 amount%=900
  270 FOR pass%=0 TO 2 STEP 2
  280 P%=code%
  290 [OPTpass%
  300 .random FNrndplace
  310 .rndadd EQUD random
  320 .rndcnt EQUD random
  330 .xstart EQUD RND(320)<<16
  340 .ystart EQUD RND(256)<<16
  350 .which  EQUD 1
  360 .colour EQUB RND(255)
  370 EQUB RND(255)
  380 EQUB RND(255)
  390 EQUB RND(255)
  400 EQUB RND(255)
  410 EQUB RND(255)
  420 .colno1 EQUB RND(255)
  430 .colno2 EQUB RND(255)
  440 .coladd EQUB 0
  450 ALIGN
  460 .vdu    EQUD 148
  470 EQUD -1
  480 ALIGN
  490
  500 .start  STR     link,return
  510 LDR     base,vdu
  520 ADD     top,base,#81920
  530 SUB     top,top,#640
  540 MOV     track,#1
  550 MOV     key,#1
  560 .loop   SWI     "OS_ReadEscapeState"
  570 BCS     end
  580 MOV     count,#0
  590 ADD     key,key,#1
  600 CMP     key,#100
  610 BLGT    set
  620 ADR     add,data+32
  630 .loop2  ADD     count,count,#1
  640 TEQ     count,#(amount%/3)
  650 BLEQ    chng2
  660 TEQ     count,#(amount%/3*2)
  670 BLEQ    chng4
  680 TEQ     count,#1
  690 BLEQ    chng1
  700 MOV     temp,#0
  710 ADD     x,add,track,LSL#2
  720 LDR     point,[x,#-36]
  730 CMP     point,top
  740 CMPLT   base,point
  750 STRLTB  temp,[point]
  760 LDMIA   add,{x,y,h,v}
  770 CMP     x,#65536
  780 CMPGT   y,#131072
  790 BLE     skip1
  800 CMP     x,#(316<<16)
  810 CMPLT   y,#16646144
  820 BGE     skip1
  830 MOV     temp,y,LSR#16
  840 ADD     point,base,temp,LSL#8
  850 ADD     point,point,temp,LSL#6
  860 ADD     point,point,x,LSR#16
  870 MOV     temp,#0
  880 STRB    temp,[point],#640
  890 STRB    temp,[point],#-321
  900 STRB    temp,[point],#2
  910 STRB    temp,[point]
  920 .skip1  SUB     x,x,h
  930 SUB     v,v,#1024
  940 SUB     y,y,v
  950 CMP     h,#0
  960 ADDLT   h,h,#64
  970 SUBGT   h,h,#64
  980 MOV     point,#0
  990 TEQ     key,#1
 1000 BLEQ    reset
 1010 CMP     x,#65536
 1020 CMPGT   y,#131072
 1030 BLE     skip2
 1040 CMP     x,#(316<<16)
 1050 CMPLT   y,#16646144
 1060 BGE     skip2
 1070 MOV     temp,y,LSR#16
 1080 ADD     point,base,temp,LSL#8
 1090 ADD     point,point,temp,LSL#6
 1100 ADD     point,point,x,LSR#16
 1110 LDRB    temp,colno1
 1120 STRB    temp,[point],#640
 1130 STRB    temp,[point],#-321
 1140 STRB    temp,[point],#2
 1150 STRB    temp,[point]
 1160 .skip2  STMIA   add,{x,y,h,v}
 1170 SUB     temp,point,#1
 1180 SUB     add,add,#36
 1190 ADD     x,add,track,LSL#2
 1200 STR     temp,[x]
 1210 LDRB    temp,colno2
 1220 FNplottracks
 1230 ADD     add,add,#52
 1240 CMP     count,#amount%
 1250 BLE     loop2
 1260 ADD     track,track,#1
 1270 CMP     track,#tracks%
 1280 MOVGT   track,#1
 1290 B       loop
 1300 .end    LDR     pc,return
 1310 .return EQUD 0
 1320
 1330 .reset  LDR     temp,which
 1340 CMP     count,temp
 1350 MOVLT   pc,link
 1360 ADD     temp,temp,#(amount%/3)
 1370 CMP     count,temp
 1380 MOVGT   pc,link
 1390 LDR     x,xstart
 1400 LDR     y,ystart
 1410 LDR     temp,rndcnt
 1420 ADR     h,rndadd
 1430 CMP     temp,h
 1440 LDRGE   temp,rndadd
 1450 LDR     h,[temp],#4
 1460 LDR     v,[temp],#4
 1470 STR     temp,rndcnt
 1480 STMIA   add,{x,y,h,v}
 1490 MOV     pc,link
 1500 .set    SUB     key,key,#100
 1510 LDR     x,xstart
 1520 LDR     y,ystart
 1530 ADD     x,x,y,LSR#1
 1540 ADD     x,x,#16<<16
 1550 CMP     x,#320<<16
 1560 SUBGE   x,x,#300<<16
 1570 STR     x,xstart
 1580 ADD     y,y,x
 1590 SUB     y,y,#64<<16
 1600 CMP     y,#256<<16
 1610 SUBGE   y,y,#250<<16
 1620 CMP     y,#1<<16
 1630 ADDLE   y,y,#250<<16
 1640 STR     y,ystart
 1650 LDR     temp,which
 1660 ADD     temp,temp,#(amount%/3)
 1670 CMP     temp,#amount%
 1680 MOVGT   temp,#1
 1690 STR     temp,which
 1700 LDRB    temp,coladd
 1710 ADD     temp,temp,#2
 1720 CMP     temp,#6
 1730 MOVGE   temp,#0
 1740 STRB    temp,coladd
 1750 ADR     x,colour
 1760 ADD     temp,x,temp
 1770 LDRB    x,[temp]
 1780 ADD     x,x,#3
 1790 CMP     x,#255
 1800 SUBGE   x,x,#253
 1810 STRB    x,[temp]
 1820 LDRB    y,[temp,#1]!
 1830 SUB     y,y,#5
 1840 CMP     y,#1
 1850 ADDGE   y,y,#256
 1860 STRB    y,[temp]
 1870 MOV     pc,link
 1880
 1890 .chng2  LDRB    x,colour+2
 1900 STRB    x,colno1
 1910 LDRB    x,colour+3
 1920 STRB    x,colno2
 1930 MOV     pc,link
 1940
 1950 .chng4  LDRB    x,colour+4
 1960 STRB    x,colno1
 1970 LDRB    x,colour+5
 1980 STRB    x,colno2
 1990 MOV     pc,link
 2000
 2010 .chng1  LDRB    x,colour
 2020 STRB    x,colno1
 2030 LDRB    x,colour+1
 2040 STRB    x,colno2
 2050 MOV     pc,link
 2060 .data
 2070 ]
 2080 NEXTpass%
 2090 SYS "OS_ReadVduVariables",vdu,vdu
 2100 PROCpoints
 2110 ENDPROC
 2120
 2130 DEF PROCpoints
 2140 x%=RND(1280)<<14
 2150 y%=(256<<16)-(RND(1024)<<14)
 2160 n%=0
 2170 c=4*tracks%
 2180 FOR n=data+c TO data+amount%*(16+c)+c STEP 16+c
 2190 n%+=1
 2200 IF n% MOD (amount%/5)=0 x%=RND(1280)<<14:y%=(256<<16)-(RND(1024)<<14)
 2210 a=RAD(RND(360000)/1000)
 2220 d=1-1/(1+RND(10000)/1000)
 2230 !n=x%
 2240 n!4=y%
 2250 n!8=speed%*COS(a)*d
 2260 n!12=speed%*SIN(a)*d
 2270 FOR l%=n+16 TO n+16+c STEP 4
 2280 !l%=0
```

```
2290 NEXT
2300 NEXT
2310 ENDPROC
2320 :
2330 DEF FNplottracks
2340 FOR n=1 TO tracks%
2350 [OPT pass%
2360 LDR     point,[add,#4]!
2370 CMP     point,top
2380 CMPLT   base,point
2390 STRLTB  temp,[point]
2400 ]
2410 NEXT
2420 =0
2430 :
2440 DEF FNrndplace
2450 FOR n=1 TO 700
2460 a=RAD(RND(360000)/1000)
2470 d=1-1/(1+RND(10000)/1000)
2480 [OPT pass%
2490 EQUD speed%*COSa*d
2500 EQUD speed%*SINa*d
2510 ]
2520 NEXT
2530 =0
```

Listing 6 – EpsonCodes

```
   10 REM >EpsonCodes (Info6)
   20 REM by Simon Weaver
   30 REM for 32-bit machines
   40 REM (c) BAU February 1993
   50 :
   60 PROCcodes
   70 END
   80 :
   90 DEF PROCcodes
  100 REPEAT
  110 READ style$
  120 IF style$<>"END" THEN
  130 p$=""
  140 REPEAT
  150 READ val%
  160 IF val%>-1 THEN p$+="|<1>|<"+STR$v
al%+">"
  170 UNTIL val%=-1
  180 OSCLI "SET Alias$"+style$+" ECHO |
<2>"+p$+"|<3>"
  190 ENDIF
  200 UNTIL style$="END"
  210 ENDPROC
  220 :
  230 REM Printer data in form - DATA co
mmand,code,code,code,..,-1
  240 :
  250 DATA DRAFT,27,120,0,-1
  260 DATA NLQ,27,120,1,-1
  270 DATA ROMAN,27,107,0,-1
  280 DATA SANSERIF,27,107,1,-1
  290 DATA COURIER,27,107,2,-1
  300 DATA PRESTIGE,27,107,3,-1
  310 DATA SCRIPT,27,107,4,-1
  320 DATA OCRB,27,107,5,-1
  330 DATA OCRA,27,107,6,-1
  340 DATA ORATOR,27,107,7,-1
  350 DATA ORATORS,27,107,8,-1
  360 DATA DSTRIKE,27,71,-1
  370 DATA SSTRIKE,27,72,-1
  380 DATA EMPHASIZE,27,69,-1
  390 DATA EMPHASIZEOFF,27,70,-1
  400 DATA 10CPI,27,80,-1
  410 DATA 12CPI,27,77,-1
  420 DATA 15CPI,27,103,-1
  430 DATA ITALIC,27,52,-1
  440 DATA ITALICOFF,27,53,-1
  450 DATA BOLD,27,69,-1
  460 DATA BOLDOFF,27,70,-1
  470 DATA ELITE,27,77,-1
  480 DATA PICA,27,80,-1
  490 DATA WIDE,27,87,1,-1
  500 DATA WIDEOFF,27,87,0,-1
  510 DATA HIGH,27,119,1,-1
  520 DATA HIGHOFF,27,119,0,-1
  530 DATA CONDENSE,15,-1
  540 DATA CONDENSEOFF,18,-1
  550 DATA UNDERLINE,27,45,1,-1
  560 DATA UNDERLINEOFF,27,45,0,-1
  570 DATA SMALLEST,27,72,27,83,0,27,51,
18,15,-1
  580 DATA PRBEEP,7,-1
  590 DATA RESET,27,64,7,7,7,-1
  600 DATA PAPERSENSOROFF,27,56,-1
  610 DATA PAPERSENSOR,27,57,-1
  620 DATA HALFSPEED,27,115,1,-1
  630 DATA FULLSPEED,27,115,0,-1
  640 DATA END
```

Listing 7 – Ominoes

```
   10 REM >Ominoes (Info7)
   20 REM Ominoes Challenge
   30 REM By dL
   40 REM For all machines
   50 REM (C) BAU February 1992
   60 :
   70 main_seed=RND(714025)
   80 boards%=10
   90 minx=7:maxx=15
  100 miny=7:maxy=15
  110 :
  120 ON ERROR VDU 20,31,0,30:IF ERR=17
END ELSE PRINT"Disqualified":END
  130 IF HIMEM>&10000 MODE 9:colours=8 E
LSE MODE 4:colours=2
  140 VDU 23;10,32;0;0;0;0;
  150 PROCinit
  160 PROCread_paths
  170 PROCuser_init
  180 total%=0
  190 COLOUR 5:PRINTTAB(24,9);"Shape:"
  200 PROCbox(26,16,30,12)
  210 start%=TIME
  220 FOR board%=1 TO boards%
  230 seed=(main_seed*board%) MOD 714025
  240 board$=FNrandom_board
  250 PROCuser_newboard(board$)
  260 fitted%=0
  270 PROCstats(15)
  280 then%=TIME
  290 REPEAT
  300 pick=FNrnd(pieces*8)-1
  310 PROCshow_piece(pick)
  320 params$=FNuser_fit(piece$(pick))
  330 IF params$="" THEN fit%=FALSE ELSE
 fit%=EVAL("FNtry("+STR$pick+","+params$
+")")
  340 IF fit% fitted%=fitted%+1:PROCstat
s(5)
  350 UNTIL NOT fit%
  360 IF TIME-then%>30000 PRINTTAB(0,30)
;"Disqualified":END
  370 total%=total%+fitted%
  380 PROCstats(3)
  390 NEXT
  400 END
  410 :
  420 DEF PROCstats(bits)
  430 IF bits AND 8 COLOUR 5:PRINTTAB(24
,1);"Board:  ";:COLOUR 3:PRINT;board%;
  440 IF bits AND 4 COLOUR 5:PRINTTAB(24
,3);"Pieces: ";:COLOUR 3:PRINT;fitted%;S
PC(39-POS);
  450 IF bits AND 2 COLOUR 5:PRINTTAB(24
,5);"Total:  ";:COLOUR 3:PRINT;total%;
  460 IF bits AND 1 COLOUR 5:PRINTTAB(24
,7);"Time:   ";:COLOUR 3:PRINT;TIME-star
t%;SPC(39-POS);
  470 ENDPROC
  480 :
  490 DEF PROCinit
  500 DIM dx(3),dy(3),b(maxx-1,maxy-1),x
flip(15),yflip(15)
  510 FOR d=0 TO 3
  520 READ dx(d),dy(d)
  530 NEXT
  540 FOR c=0 TO 15
  550 VDU 23,224+c,FNbit(c,0)*&7E
  560 FOR i=1 TO 6
  570 VDU &7E OR FNbit(c,1) OR 128*FNbit
(c,3)
  580 NEXT
  590 VDU FNbit(c,2)*&7E
  600 NEXT
  610 VDU 23,254,&81,&42,&24,&18,&18,&24
,&42,&81
  620 VDU 23,255,&AA,0,&55,0,&AA,0,&55,0
  630 FOR i=0 TO 15
  640 xflip(i)=8*FNbit(i,1) OR 2*FNbit(i
,3) OR (i AND 5)
  650 yflip(i)=4*FNbit(i,0) OR 1*FNbit(i
,2) OR (i AND 10)
  660 NEXT
  670 ENDPROC
  680 :
  690 DEF FNbit(c,b)=SGN(c AND 2^b)
  700 :
  710 DEF PROCread_paths
  720 READ pieces
  730 DIM piece$(pieces*8-1)
  740 widest%=0
  750 tallest%=0
  760 FOR i=0 TO pieces-1
  770 READ path$
  780 FOR j=0 TO 7
  790 piece=i*8+j:rot=j MOD 4:flip=3*SGN
(j DIV 4)
  800 x=9:y=9:xl=x:xh=x:yl=y:yh=y:b(x,y)
=piece+1
  810 FOR k=1 TO LENpath$
  820 d=((VALMID$(path$,k,1)+rot)MOD4)EO
Rflip
  830 x=x+dx(d):y=y+dy(d):b(x,y)=piece+1
  840 IF x<xl xl=x ELSE IF x>xh xh=x
  850 IF y<yl yl=y ELSE IF y>yh yh=y
  860 NEXT
  870 xsize=xh-xl+1:ysize=yh-yl+1
  880 IF xsize>widest% widest%=xsize
  890 IF ysize>tallest% tallest%=ysize
  900 p$=STR$xsize+STR$ysize
  910 FOR y=yl TO yh
  920 FOR x=xl TO xh
  930 IF b(x,y)=piece+1 p$=p$+FNchar(x,y
) ELSE p$=p$+" "
  940 NEXT
  950 NEXT
  960 piece$(piece)=p$
  970 NEXT
  980 NEXT
  990 ENDPROC
 1000 :
 1010 DEF FNchar(x,y)
 1020 =CHR$(224-1*(b(x,y-1)=piece+1)-2*(
b(x+1,y)=piece+1)-4*(b(x,y+1)=piece+1)-8
*(b(x-1,y)=piece+1))
 1030 :
 1040 DEF FNrnd(mod)
 1050 seed=(seed*1366+150889) MOD 714025
 1060 =1+(seed DIV 64) MOD mod
 1070 :
 1080 DEF FNrandom_board
 1090 REPEAT
 1100 width%=minx-1+FNrnd(maxx-minx+1)
 1110 height%=miny-1+FNrnd(maxy-miny+1)
 1120 area%=width%*height%
 1130 UNTIL area%<256
 1140 VDU 28,0,maxx+1,maxy+1,0,12,26
 1150 FOR y=0 TO height%-1
 1160 FOR x=0 TO width%-1
 1170 b(x,y)=0
 1180 NEXT
 1190 NEXT
 1200 IF FNrnd(2)=1 FOR i=1 TO FNrnd(are
a% DIV 10):b(FNrnd(width%)-1,FNrnd(heigh
t%)-1)=1:NEXT
 1210 PROCbox(1,height%,width%,1)
 1220 b$=""
 1230 FOR y=0 TO height%-1
 1240 FOR x=0 TO width%-1
 1250 b$=b$+CHR$(32+b(x,y)*223)
 1260 VDU 31,x+1,y+1,b(x,y)*255
 1270 NEXT
 1280 NEXT
 1290 =b$
 1300 :
 1310 DEF PROCbox(x0,y1,x1,y0)
 1320 COLOUR 7
 1330 FOR y=y0 TO y1:VDU 31,x0-1,y,229,3
1,x1+1,y,229:NEXT
 1340 FOR x=x0 TO x1:VDU 31,x,y0-1,234,3
1,x,y1+1,234:NEXT
 1350 VDU 31,x0-1,y0-1,230,31,x0-1,y1+1,
227,31,x1+1,y0-1,236,31,x1+1,y1+1,233
 1360 ENDPROC
 1370 :
 1380 DEF PROCshow_piece(piece)
 1390 VDU 28,26,16,30,12,12
 1400 IF colours>2 COLOUR RND(colours-2)
 1410 p$=piece$(piece):xs=VALMID$(p$,1,1
):ys=VALMID$(p$,2,1):mid=3
 1420 FOR y=0 TO ys-1
 1430 FOR x=0 TO xs-1
 1440 PRINTTAB(x,y);MID$(p$,mid,1);
 1450 mid=mid+1
 1460 NEXT
 1470 NEXT
 1480 VDU 26
 1490 ENDPROC
 1500 :
 1510 DEF FNtry(piece,xpos,ypos,rot)
 1520 p$=piece$(piece)
 1530 xs=VALMID$(p$,1,1):ys=VALMID$(p$,2
,1)
 1540 xstep=SGNxpos:xpos=ABSxpos
 1550 ystep=SGNypos:ypos=ABSypos
 1560 mid=3:fitted=TRUE
 1570 FOR y=0 TO ys-1
 1580 xx=xpos:yy=ypos
 1590 FOR x=0 TO xs-1
 1600 VDU 31,xx,yy
 1610 char=ASCMID$(p$,mid,1):mid=mid+1
 1620 solid=(char<>32)
 1630 onboard=(xx>0 AND yy>0 AND xx<=wid
th% AND yy<=height%)
 1640 IF NOT onboard empty=FALSE ELSE em
pty=(b(xx-1,yy-1)=0)
 1650 ok=FALSE
 1660 IF onboard AND solid AND empty ok=
TRUE:VDU FNrot(char):b(xx-1,yy-1)=2
 1670 IF NOT solid ok=TRUE
 1680 IF NOT ok VDU 254
 1690 fitted=fitted AND ok
 1700 xx=xx+xstep*dx(rot)
 1710 yy=yy+ystep*dy(rot)
 1720 NEXT
 1730 xpos=xpos+xstep*dx((rot+3)MOD4)
 1740 ypos=ypos+ystep*dy((rot+3)MOD4)
 1750 NEXT
 1760 =fitted
 1770 :
 1780 DEF FNrot(c)
 1790 c=((c-224)*16) DIV (2^rot)
 1800 c=(c MOD 16) OR (c DIV 16)
 1810 IF xstep<0 c=xflip(c)
 1820 IF ystep<0 c=yflip(c)
 1830 =c+224
 1840 :
 1850 DATA 1,0, 0,-1, -1,0, 0,1
 1860 :
 1870 DATA 2+5+12
 1880 DATA 00,01
 1890 DATA 000,001,0130,010,012
 1900 DATA 0000,0001,00130,0011,0010,010
1,01020,002311,0112,00311,0110,0012
 1910 :
 1920 REM Append your routines here...
```

Listing 8 – Random

```
   10 REM >Random (Info8)
   20 REM *Very* stupid routines for Omi
noes challenge
   30 :
   40 DEF PROCuser_init
   50 DIM board 1024,add(7)
   60 FOR i=0 TO 7
   70 READ add(i)
   80 NEXT
   90 ENDPROC
  100 :
  110 DATA 1,0,-1,0,1,0,-1,0
  120 :
  130 DEF PROCuser_newboard(board$)
  140 mid=1
  150 FOR y=-tallest% TO height%-1 +tall
est%
  160 FOR x=-widest% TO width%-1 +widest
%
  170 IF x>=0 AND y>=0 AND x<width% AND
y<height% val=ASCMID$(board$,mid,1):mid=
mid+1 ELSE val=-1
  180 board?(x+widest%+(y+tallest%)*(wid
th%+2*widest%))=val
  190 NEXT
  200 NEXT
  210 ENDPROC
  220 :
  230 DEF FNuser_fit(shape$)
  240 tries=0
  250 REPEAT
  260 x=RND(width%) *SGNRND
  270 y=RND(height%)*SGNRND
  280 r=RND(4)-1
  290 itfits=FNfit(x,y,r)
  300 tries=tries+1
  310 UNTIL itfits OR tries>100
  320 IF itfits THEN =STR$x+","+STR$y+",
"+STR$r
  330 =""
  340 :
  350 DEF FNfit(fitx,fity,fitr)
  360 IF NOT FNfit2(fitx,fity,fitr,FALSE
) THEN =FALSE
  370 =FNfit2(fitx,fity,fitr,TRUE)
  380 :
  390 DEF FNfit2(fx,fy,fr,zap)
  400 LOCAL x,y
  410 xs=VALMID$(shape$,1,1):ys=VALMID$(
shape$,2,1)
  420 xstep=SGNfx:fx=ABSfx
  430 ystep=SGNfy:fy=ABSfy
  440 mid=3:flag=TRUE
  450 y=0:REPEAT
  460 xx=fx:yy=fy
  470 x=0:REPEAT
  480 char=ASCMID$(shape$,mid,1):mid=mid
+1
  490 a=xx+widest%-1+(yy+tallest%-1)*(wi
dth%+2*widest%)
  500 IF char<>32 AND board?a<>32 flag=F
ALSE
  510 IF char<>32 AND flag AND zap board
?a=char
  520 xx=xx+xstep*add(fr)
  530 yy=yy+ystep*add(fr+1)
  540 x=x+1:UNTIL NOT flag OR x=xs
  550 fx=fx+xstep*add(fr+3)
  560 fy=fy+ystep*add(fr+4)
  570 y=y+1:UNTIL NOT flag OR y=ys
  580 =flag
```

Listing 9 – Exhaust

```
   10 REM >Exhaust (Info9)
   20 REM Stupid routines for Ominoes ch
allenge
   30 :
   40 DEF PROCuser_init
   50 DIM board 1024,add(7)
   60 FOR i=0 TO 7
   70 READ add(i)
   80 NEXT
   90 ENDPROC
  100 :
  110 DATA 1,0,-1,0,1,0,-1,0
  120 :
  130 DEF PROCuser_newboard(board$)
  140 mid=1
  150 FOR y=-tallest% TO height%-1 +tall
est%
  160 FOR x=-widest% TO width%-1 +widest
%
  170 IF x>=0 AND y>=0 AND x<width% AND
y<height% val=ASCMID$(board$,mid,1):mid=
mid+1 ELSE val=-1
  180 board?(x+widest%+(y+tallest%)*(wid
th%+2*widest%))=val
  190 NEXT
  200 NEXT
  210 ENDPROC
  220 :
  230 DEF FNuser_fit(shape$)
  240 y=1:REPEAT
  250 x=1:REPEAT
  260 r=0:REPEAT
  270 xsign=-1:REPEAT
  280 ysign=-1:REPEAT
  290 itfits=FNfit(x*xsign,y*ysign,r)
  300 IF itfits result$=STR$(x*xsign)+",
"+STR$(y*ysign)+","+STR$r
  310 ysign=-ysign:UNTIL ysign=-1 OR itf
its
  320 xsign=-xsign:UNTIL xsign=-1 OR itf
its
  330 r=r+1:UNTIL r=2 OR itfits
  340 x=x+1:UNTIL x>width% OR itfits
  350 y=y+1:UNTIL y>height% OR itfits
  360 IF itfits THEN =result$
  370 =""
  380 :
  390 DEF FNfit(fitx,fity,fitr)
  400 IF NOT FNfit2(fitx,fity,fitr,FALSE
) THEN =FALSE
  410 =FNfit2(fitx,fity,fitr,TRUE)
  420 :
  430 DEF FNfit2(fx,fy,fr,zap)
  440 LOCAL x,y
  450 xs=VALMID$(shape$,1,1):ys=VALMID$(
shape$,2,1)
  460 xstep=SGNfx:fx=ABSfx
  470 ystep=SGNfy:fy=ABSfy
  480 mid=3:flag=TRUE
  490 y=0:REPEAT
  500 xx=fx:yy=fy
  510 x=0:REPEAT
  520 char=ASCMID$(shape$,mid,1):mid=mid
+1
  530 a=xx+widest%-1+(yy+tallest%-1)*(wi
dth%+2*widest%)
  540 IF char<>32 AND board?a<>32 flag=F
ALSE
  550 IF char<>32 AND flag AND zap board
?a=char
  560 xx=xx+xstep*add(fr)
  570 yy=yy+ystep*add(fr+1)
  580 x=x+1:UNTIL NOT flag OR x=xs
  590 fx=fx+xstep*add(fr+3)
  600 fy=fy+ystep*add(fr+4)
  610 y=y+1:UNTIL NOT flag OR y=ys
  620 =flag
```

Listing 10 – Kaleid

```
   10 REM >Kaleid (Info10)
   20 REM By Dave Lawrence
   30 REM For 32 bit machines
   40 REM (c) BAU February 1993
   50 :
   60 MODE 13:OFF
   70 :
   80 images   = 8 : REM 1, 4 or 8
   90 twobanks = FALSE
  100 :
  110 PROCinit
  120 PROCcode
  130 REPEAT
  140 PROCrings
  150 CALL go
  160 UNTIL INKEY-1
  170 END
  180 :
  190 DEF PROCrings
  200 dot=0
  210 FOR ring=1 TO RND(6)
  220 REPEAT
  230 rad  = RND(120)
  240 size = RND(60)
  250 dir  = SGNRND
  260 UNTIL rad-size>0 AND rad+size<120
  270 steps = RND(10)
  280 IF RND(2)=1 THEN
  290 base = 0
  300 cols = 128
  310 ELSE
  320 base = 128
  330 cols = 64
  340 ENDIF
  350 poff  = RND(cols)
  360 cstep = RND(4)
  370 wobb  = RND(1)
  380 FOR i=0 TO 255
```

```
  390 PROCdot(rad+dir*size*SINRAD(i*step
s*360/256),(1-wobb*SINRAD(i*360/256))*i*
360/256,base+(poff+i*cstep) MOD cols)
  400 NEXT
  410 NEXT
  420 Data!(dot*12+0)=-1:Data!(dot*12+4)
=-1:Data!(dot*12+8)=-1
  430 ENDPROC
  440 :
  450 DEF PROCdot(r,a,c)
  460 Data!(dot*12+0)=r*&100
  470 Data!(dot*12+4)=(a*4) MOD angles
  480 Data!(dot*12+8)=c
  490 dot+=1
  500 ENDPROC
  510 :
  520 DEF PROCinit
  530 angles=360*4
  540 DIM code 1000,Sin angles*4,Cos ang
les*4,Pal 256
  550 mem=HIMEM-END-10240
  560 DIM Data mem
  570 maxdots=mem DIV (3*4)
  580 sp=13:link=14:pc=15
  590 ENDPROC
  600 :
  610 DEF PROCcode
  620 FOR pass=0 TO 2 STEP 2:P%=code
  630 [OPT pass
  640 .go
  650 LDR     R7,sin
  660 LDR     R8,cos
  670 LDR     R6,pal
  680 .animloop
  690 ]
  700 IF twobanks THEN
  710 [OPT pass
  720 LDR     R0,screen
  730 LDR     R1,screen+4
  740 STR     R0,screen+4
  750 STR     R1,screen
  760
  770 MOV     R0,#19
  780 SWI     "OS_Byte"
  790 MOV     R0,#113
  800 LDR     R1,disp
  810 SWI     "XOS_Byte"
  820 MOV     R0,#112
  830 LDR     R1,disp
  840 RSB     R1,R1,#3
  850 STR     R1,disp
  860 SWI     "XOS_Byte"
  870 SWI     256+12
  880 ]
  890 ELSE
  900 [OPT pass
  910 MOV     R0,#19
  920 SWI     "OS_Byte"
  930 SWI     256+12
  940 ]
  950 ENDIF
  960 [OPT pass
  970 LDR     R11,screen
  980 ADD     R11,R11,#128*320
  990 ADD     R11,R11,#160
 1000
 1010 LDR     R10,data
 1020 .plotloop
 1030 LDMIA   R10!,{R3-R5}
 1040 CMN     R3,#1
 1050 BEQ     plotted
 1060
 1070 CMP     R4,#360*4/images
 1080 BCS     oor
 1090 LDR     R0,[R7,R4,ASL #2]
 1100 MUL     R0,R3,R0
 1110 LDR     R1,[R8,R4,ASL #2]
 1120 MUL     R1,R3,R1
 1130
 1140 MOV     R1,R1,ASR #24
 1150 MOV     R0,R0,ASR #24
 1160 LDRB    R2,[R6,R5]
 1170
 1180 ADD     R12,R11,R1,ASL #6
 1190 ADD     R12,R12,R1,ASL #8
 1200 STRB    R2,[R12,R0]
 1210 ]
 1220 IF images=1 [OPT pass:B oor:]
 1230 [OPT pass
 1240 STRB    R2,[R12,-R0]
 1250
 1260 SUB     R12,R11,R1,ASL #6
 1270 SUB     R12,R12,R1,ASL #8
 1280 STRB    R2,[R12,R0]
 1290 STRB    R2,[R12,-R0]
 1300 ]
 1310 IF images=4 [OPT pass:B oor:]
 1320 [OPT pass
 1330 ADD     R12,R11,R0,ASL #6
 1340 ADD     R12,R12,R0,ASL #8
 1350 STRB    R2,[R12,R1]
 1360 STRB    R2,[R12,-R1]
 1370
 1380 SUB     R12,R11,R0,ASL #6
 1390 SUB     R12,R12,R0,ASL #8
 1400 STRB    R2,[R12,R1]
 1410 STRB    R2,[R12,-R1]
 1420 .oor
 1430 SUBS    R4,R4,#1
 1440 ADDMI   R4,R4,#angles
 1450
 1460 SUBS    R5,R5,#1
 1470 ADDMI   R5,R5,#192
 1480 STMDB   R10,{R4,R5}
 1490
 1500 B       plotloop
 1510
 1520 .plotted
 1530 SWI     "XOS_ReadEscapeState"
 1540 BCC     animloop
 1550
 1560 MOV     R0,#126
 1570 SWI     "XOS_Byte"
 1580
 1590 MOV     pc,link
 1600
 1610 .sin    EQUD    Sin
 1620 .cos    EQUD    Cos
 1630 .data   EQUD    Data
 1640 .screen EQUD    148
 1650 EQUD    -1
 1660 .disp   EQUD    1
 1670 .pal    EQUD    Pal
 1680 ]NEXT
 1690 SYS "OS_ReadVduVariables",screen,s
creen
 1700 screen!4=!screen+320*256
 1710 FOR a=0 TO angles-1
 1720 Sin!(a*4)=SINRAD(360*a/angles)*&10
000
 1730 Cos!(a*4)=COSRAD(360*a/angles)*&10
000
 1740 NEXT
 1750 FOR i=0 TO 128+64-1
 1760 READ c$
 1770 Pal?i=EVAL("&"+c$)
 1780 NEXT
 1790 ENDPROC
 1800 :
 1810 DATA FF,DF,DE,DD,DC,B3,B2,B1,B0,0F
,0E,0D,0C,0D,0E,0F
 1820 DATA 98,99,9A,BA,BB,BA,B9,B8,87,86
,85,84,91,91,92,93
 1830 DATA BC,BD,BE,BF,B7,B6,B5,B4,1B,1A
,19,18,19,1A,1B,94
 1840 DATA B4,B5,B6,B7,3F,3E,3D,3C,13,12
,11,10,14,15,16,17
 1850 DATA 16,3D,3E,3F,3F,D6,D7,D6,D5,D4
,3B,3A,39,38,07,06
 1860 DATA 05,04,30,31,32,33,5C,5D,5E,5D
,55,56,57,7C,74,75
 1870 DATA 76,77,7F,F7,F6,F5,F4,5B,5A,59
,58,27,26,25,24,20
 1880 DATA 21,00,00,01,02,03,2C,2D,2E,D0
,D1,D2,D3,FC,FD,FE
 1890 :
 1900 DATA 08,04,0C,10,18,14,1C,1D,1E,1F
,3C,3D,3E,3F,5C,5D
 1910 DATA 5E,5F,7C,7D,7E,7F,77,7B,73,6F
,67,6B,63,E3,E2,E1
 1920 DATA E0,C3,C2,C1,C0,A3,A2,A1,A0,83
,82,81,80,88,84,8C
 1930 DATA 90,98,94,9C,9D,9E,9F,BC,BD,BE
,BF,DC,DD,DE,DF,FF
```

Listing 11 – Wave8

```
   10 REM >Wave8 (Info11)
   20 REM Source code for wavy scroll
   30 REM by Matthew Godbolt
   40 REM for 8-bit machines
   50 REM (c) BAU February 1993
   60 :
   70 IF PAGE<>&3000 THEN PAGE=&3000:CHA
IN "Wave8"
   80 REM In the message :
   90 REM 0,n : n=wave speed
  100 REM 1,n : n=length of stop
  110 REM 2,n : n=new wave number
  120 REM 3,n : n=new text speed 0<n<5
  130 MODE 7
  140 :
  150 PRINT "Assembling ...";
  160 read=&70
  170 write=&72
  180 tbit=&74
  190 char=&75
  200 scr=&76
  210 xpos=&77
  220 text=&78
  230 wave=&7A
  240 scrp=&7B
  250 readp=&7C
  260 otext=&7D
  270 otbit=&7F
  280 wavespd=&80
  290 owave=&81
  300 counter=&82
  310 wpoint=&83
  320 textspeed=&85
  330 :
  340 osbyte=&FFF4
  350 oswrch=&FFEE
  360 FOR pass%=0 TO 2 STEP 2
  370 P%=&1100
  380 [OPT pass%
  390 .start
  400 LDA #22
  410 JSR oswrch
  420 LDA #2
  430 JSR oswrch
  440 LDA #mes MOD 256
  450 STA text
  460 STA otext
  470 LDA #mes DIV 256
  480 STA text+1
  490 STA otext+1
  500 LDA #0
  510 STA tbit
  520 STA otbit
  530 STA counter
  540 STA scr
  550 LDA #1
  560 STA wavespd
  570 STA textspeed
  580 LDA #12
  590 STA &FE00
  600 LDA #6
  610 STA &FE01
  620 LDA #6
  630 STA &FE00
  640 LDA #16
  650 STA &FE01
  660 LDA #7
  670 STA &FE00
  680 LDA #27
  690 STA &FE01
  700 LDA #10
  710 STA &FE00
  720 LDA #32
  730 STA &FE01
  740 LDA #&30
  750 STA add+1
  760 .mainloop
  770 LDA wave
  780 STA owave
  790 LDA add+1
  800 BNE screen2
  810 .screen1
  820 LDA #0
  830 TAY
  840 .cls1
  850 ]
  860 FOR byte%=&38 TO &52
  870 [OPT pass%
  880 STA byte%*256,Y
  890 ]
  900 NEXT
  910 [OPT pass%
  920 INY
  930 BNE cls1
  940 JMP donecls
  950 :
  960 .screen2
  970 LDA #0
  980 TAY
  990 .cls2
 1000 ]
 1010 FOR byte%=&60 TO &7A
 1020 [OPT pass%
 1030 STA byte%*256,Y
 1040 ]
 1050 NEXT
 1060 [OPT pass%
 1070 INY
 1080 BNE cls2
 1090 .donecls
 1100 LDA #0
 1110 STA xpos
 1120 .loop1
 1130 LDY #0
 1140 STY read
 1150 LDA (text),Y
 1160 CMP #13
 1170 BNE notend
 1180 LDA #mes MOD 256
 1190 STA text
 1200 LDA #mes DIV 256
 1210 STA text+1
 1220 JMP loop1
 1230 .notend
 1240 CMP #0
 1250 BNE notwave
 1260 INY
 1270 LDA (text),Y
 1280 STA wavespd
 1290 CLC
 1300 LDA text
 1310 ADC #2
 1320 STA text
 1330 BCC loop1
 1340 INC text+1
 1350 JMP loop1
 1360 .notwave
 1370 CMP #1
 1380 BNE notstop
 1390 CLC
 1400 LDA text
 1410 ADC #2
 1420 STA text
 1430 BCC loop1
 1440 INC text+1
 1450 JMP loop1
 1460 .notstop
 1470 CMP #2
 1480 BNE notchange
 1490 LDY #1
 1500 LDA (text),Y
 1510 ASL A
 1520 TAX
 1530 LDA wavetab,X
 1540 STA wpoint
 1550 LDA wavetab+1,X
 1560 STA wpoint+1
 1570 CLC
 1580 LDA text
 1590 ADC #2
 1600 STA text
 1610 BCC loop1
 1620 INC text+1
 1630 JMP loop1
 1640 .notchange
 1650 CMP #3
 1660 BNE notspd
 1670 LDY #1
 1680 LDA (text),Y
 1690 STA textspeed
 1700 CLC
 1710 LDA text
 1720 ADC #2
 1730 STA text
 1740 BCC loop1
 1750 INC text+1
 1760 JMP loop1
 1770 .notspd
 1780 SEC
 1790 SBC #32
 1800 LSR A
 1810 ROR read
 1820 LSR A
 1830 ROR read
 1840 STA read+1
 1850 LDA tbit
 1860 ASL A
 1870 ASL A
 1880 ASL A
 1890 ASL A
 1900 ADC read
 1910 STA read
 1920 .temp
 1930 LDA #0
 1940 ADC read+1
 1950 ADC #&20
 1960 STA read+1
 1970 .loop2
 1980 LDY wave
 1990 LDA (wpoint),Y
 2000 STA poke+1
 2010 LSR A
 2020 LSR A
 2030 LSR A
 2040 TAX
 2050 LDA #0
 2060 STA write+1
 2070 STA readp
 2080 LDA xpos
 2090 ASL A
 2100 ROL write+1
 2110 ASL A
 2120 ROL write+1
 2130 ASL A
 2140 ROL write+1
 2150 ADC lotab,X
 2160 STA write
 2170 LDA hitab,X
 2180 ADC write+1
 2190 .add
 2200 ADC #0
 2210 STA write+1
 2220 .poke
 2230 LDA #0
 2240 AND #7
 2250 STA scrp
 2260 LDX #15
 2270 .loop3
 2280 LDY readp
 2290 LDA (read),Y
 2300 LDY scrp
 2310 STA (write),Y
 2320 INY
 2330 CPY #8
 2340 BNE jib
 2350 LDY #0
 2360 CLC
 2370 LDA write
 2380 ADC #128
 2390 STA write
 2400 LDA write+1
 2410 ADC #2
 2420 STA write+1
 2430 .jib
 2440 STY scrp
 2450 INC readp
 2460 DEX
 2470 BPL loop3
 2480 CLC
 2490 LDA wave
 2500 ADC #1
 2510 CMP #80
 2520 BCC jump
 2530 SBC #80
 2540 .jump
 2550 STA wave
 2560 CLC
 2570 LDA xpos
 2580 ADC #1
 2590 CMP #80
 2600 BEQ end
 2610 STA xpos
 2620 CLC
 2630 LDA tbit
 2640 ADC #1
 2650 CMP #4
 2660 BCS nextc
 2670 STA tbit
 2680 CLC
 2690 LDA read
 2700 ADC #16
 2710 STA read
 2720 BCS lop
 2730 JMP loop2
 2740 .lop
 2750 INC read+1
 2760 JMP loop2
 2770 .nextc
 2780 AND #3
 2790 STA tbit
 2800 CLC
 2810 LDA text
 2820 ADC #1
 2830 STA text
 2840 BCS inc
 2850 JMP loop1
 2860 .inc
 2870 INC text+1
 2880 JMP loop1
 2890 .end
 2900 LDA counter
 2910 BEQ endo
 2920 DEC counter
 2930 JMP endp
 2940 .endo
 2950 CLC
 2960 LDA otbit
 2970 ADC textspeed
 2980 CMP #4
 2990 BCC nocarry
 3000 CLC
 3010 LDA otext
 3020 ADC #1
 3030 STA otext
 3040 BCC novf
 3050 INC otext+1
 3060 .novf
 3070 LDA #0
 3080 .nocarry
 3090 STA otbit
 3100 .endp
 3110 CLC
 3120 LDA wavespd
 3130 ADC owave
 3140 CMP #80
 3150 BCC jump2
 3160 SBC #80
 3170 .jump2
 3180 STA wave
 3190 BIT &FF
 3200 BMI end2
 3210 LDA #19
 3220 JSR osbyte
 3230 LDA scr
 3240 EOR #1
 3250 STA scr
 3260 TAX
 3270 LDA #12
 3280 STA &FE00
 3290 LDA tab,X
 3300 STA &FE01
 3310 LDA tab2,X
 3320 STA add+1
 3330 .back
 3340 LDY #0
 3350 LDA (otext),Y
 3360 CMP #13
 3370 BNE norm
 3380 LDA #mes MOD 256
 3390 STA otext
```

```
3400 LDA #mes DIV 256
3410 STA otext+1
3420 .norm
3430 CMP #0
3440 BNE norm2
3450 CLC
3460 LDA otext
3470 ADC #2
3480 STA otext
3490 LDA otext+1
3500 ADC #0
3510 STA otext+1
3520 JMP back
3530 .norm2
3540 CMP #1
3550 BNE norm3
3560 LDY #1
3570 LDA (otext),Y
3580 STA counter
3590 CLC
3600 LDA otext
3610 ADC #2
3620 STA otext
3630 LDA otext+1
3640 ADC #0
3650 STA otext+1
3660 JMP back
3670 .norm3
3680 CMP #4
3690 BCS norm4
3700 CLC
3710 LDA otext
3720 ADC #2
3730 STA otext
3740 LDA otext+1
3750 ADC #0
3760 STA otext+1
3770 JMP back
3780 .norm4
3790 LDA otbit
3800 STA tbit
3810 LDA otext
3820 STA text
3830 LDA otext+1
3840 STA text+1
3850 JMP mainloop
3860 .end2
3870 RTS
3880 :
3890 .tab
3900 EQUW &0B06
3910 .tab2
3920 EQUW &0028
3930 :
3940 .wavetab
3950 EQUW sintab
3960 EQUW seawave
3970 EQUW ripple
3980 EQUW whoosh
3990 EQUW boing
4000 EQUW harmony
4010 EQUW wibble
4020 EQUW saw
4030 :
4040 .sintab
4050 OPT FNres(80)
4060 .seawave
4070 OPT FNres(80)
4080 .ripple
4090 OPT FNres(80)
4100 .whoosh
4110 OPT FNres(80)
4120 .boing
4130 OPT FNres(80)
4140 .harmony
4150 OPT FNres(80)
4160 .wibble
4170 OPT FNres(80)
4180 .saw
4190 OPT FNres(80)
4200 .lotab
4210 OPT FNres(80)
4220 .hitab
4230 OPT FNres(80)
4240 .mes
4250 ]
4260 NEXT
4270 :
4280 PRINT'"Code assembled."
4290 PRINT'"Please wait - creating tabl
es :"
4300 PROCtable(sintab,"64+20*SINRAD(pas
s%*360/80)")
4310 PROCtable(seawave,"59+20*ABS(SINRA
D(pass%*360/80))")
4320 PROCtable(ripple,"60+(pass%AND7)")
4330 PROCtable(harmony,"64+20*(SINRAD(p
ass%*360/80)+SINRAD(pass%*1080/80)/3)")
4340 PROCtable(boing,"59-20*ABS(SINRAD(
pass%*360/80))")
4350 PROCtable(wibble,"64+20*(SINRAD(pa
ss%*360/80)+SINRAD(pass%*720/80)/2))")
4360 FOR n%=0 TO 19
4370 n%?whoosh=n%+45
4380 NEXT
4390 FOR n%=20 TO 59
4400 n%?whoosh=64
4410 NEXT
4420 FOR n%=60 TO 79
4430 n%?whoosh=124-n%
4440 NEXT
4450 FOR n%=0 TO 79 STEP 20
4460 FOR g%=0 TO 9
4470 n%?(saw+g%)=g%+64
4480 NEXT
4490 FOR g%=10 TO 19
4500 n%?(saw+g%)=84-g%
4510 NEXT
4520 NEXT
4530 FOR n%=0 TO 31
4540 x%=&3000+n%*640
4550 lotab?n%=x% AND 255
4560 hitab?n%=x% DIV 256
4570 NEXT
4580 OSCLI"LOAD Message "+STR$~mes
4590 OSCLI"LOAD Chars 2000"
4600 PRINT''"WARNING! If you haven't sa
ved this"
4610 PRINT"program, press Escape now an
d do so,"
4620 PRINT"else press any key..";
4630 *FX 15,0
4640 A%=GET
4650 CALL start
4660 END
4670 :
4680 DEF FNres(g%)
4690 P%=P%+g%
4700 =pass%
4710 :
4720 DEF PROCtable(address%,form$)
4730 FOR pass%=0 TO 79
4740 address%?pass%=EVAL(form$)
4750 NEXT
4760 VDU 46
4770 ENDPROC
```

Listing 12 – LazyFnt

```
10 REM >LazyFnt (Info12)
20 REM Font creator for wavy scroll
30 REM by Matthew Godbolt
40 REM for 8-bit machines
50 REM (c) BAU February 1993
60 :
70 MODE 2
80 block%=&900
90 X%=block% MOD 256
100 Y%=block% DIV 256
110 poke%=&5800
120 :
130 FOR n%=32 TO 96
140 PROCdisplay(n%)
150 FOR x%=0 TO 3
160 FOR y%=0 TO 15 STEP 4
170 y%!(poke%+x%*16)=!(&3000+x%*8+(y%
DIV 8)*&280+(y% AND 7))
180 NEXT
190 NEXT
200 poke%=poke%+64
210 NEXT
220 :
230 OSCLI "Save Chars 5800 "+STR$~poke
%
240 END
250 :
260 DEF PROCdisplay(c%)
270 ?block%=c%
280 A%=10
290 CALL &FFF1
300 VDU 23,128,block%?1,block%?1,block
%?2,block%?2,block%?3,block%?3,block%?4,
block%?4
310 VDU 23,129,block%?5,block%?5,block
%?6,block%?6,block%?7,block%?7,block%?8,
block%?8
320 VDU 26,128,8,10,129
330 FOR g%=0 TO 31 STEP 8
340 g%!&3000=g%!&3000 AND &03030303
350 g%!&3004=g%!&3004 AND &33333333
360 g%!&3280=g%!&3280 AND &3C3C3C3C
370 g%!&3284=g%!&3284 AND &0C0C0C0C
380 NEXT
390 ENDPROC
```

Listing 13 – LazyMes

```
10 REM >LazyMes (Info13)
20 REM Create scrollingtext
30 REM by Matthew Godbolt
40 REM for 8-bit machines
50 REM (c) BAU February 1993
60 :
70 file%=OPENOUT"Message"
80 wavespeed%=0
90 textstop%=1
100 waveno%=2
110 textspeed%=3
120 PROCoutput("@")
130 REPEAT
140 READ a$
150 IF a$<>"<end>" PROCoutput(a$)
160 UNTIL a$="<end>"
170 BPUT#file%,13
180 CLOSE#file%
190 END
200 :
210 DEF PROCoutput(a$)
220 IF a$="#" READ a%,b%:BPUT #file%,a
%:BPUT #file%,b%:ENDPROC
230 IF a$="@" FOR n%=1 TO 20:BPUT #fil
e%,32:NEXT:ENDPROC
240 FOR n%=1 TO LEN(a$)
250 BPUT #file%,ASC(MID$(a$,n%,1))
260 NEXT
270 ENDPROC
280 :
290 DATA #,wavespeed%,2
300 DATA #,textspeed%,1
310 DATA #,waveno%,0
320 DATA "HELLO AND WELCOME TO THE BBC
 ACORN USER "
330 DATA #,textstop%,32
340 DATA "** WAVY SCROLLER! **"
350 DATA @,#,wavespeed%,4
360 DATA "IF YOU'RE IMPRESSED BY THIS,
 YOU MAY AS WELL STOP THE PROGRAM NOW.."
370 DATA @,#,textspeed%,2
380 DATA "OH, YOU'RE NOT?  THEN WATCH
THIS....."
390 DATA @,#,waveno%,1
400 DATA #,textspeed%,1
410 DATA #,wavespeed%,2
420 DATA "HERE'S THE SEAWAVE EFFECT (W
AVE NUMBER 1), AND..."
430 DATA @,#,waveno%,4
440 DATA #,wavespeed%,4
450 DATA "..HERE'S ITS OPPOSITE, THE "
460 DATA #,textstop%,32
470 DATA " --== BOING! ==--  EFFECT!
"
480 DATA @,#,waveno%,6
490 DATA "NOW HERE'S THE WEIRD AND WON
DERFUL "
500 DATA #,textstop%,32
510 DATA " ** WIBBLE EFFECT ** - HANG
ON, LET'S CALM IT DOWN A BIT..."
520 DATA @,#,wavespeed%,2
530 DATA "THAT'S BETTER!"
540 DATA @,#,waveno%,2
550 DATA "AND NOW ... THE "
560 DATA #,textstop%,32
570 DATA " --== RIPPLE ==--  WAVEFOR
M."
580 DATA @,#,waveno%,5
590 DATA #,wavespeed%,4
600 DATA "HOW'S THE HANGOVER, BY THE W
AY?! THIS WAVEFORM IS DESIGNED TO BRING
OUT THE BEST IN MIGRAINES."
610 DATA @,#,waveno%,7
620 DATA #,textspeed%,2
630 DATA #,wavespeed%,0
640 DATA "WHOOSH! THE TEXT FLIES BY JU
ST LIKE THOSE ARC DEMOS (AHEM)"
650 DATA @,#,waveno%,3
660 DATA "AND SO WE COME TO THE END."
670 DATA @,#,waveno%,0
680 DATA #,wavespeed%,3
690 DATA #,textspeed%,1
700 DATA "YOU SHOULD BE IMPRESSED BY N
OW... IF NOT, GO AND BUY AN ARCHIMEDES A
ND STOP WHINING."
710 DATA @,#,wavespeed%,0
720 DATA #,textspeed%,2
730 DATA "***  ***  ***  ***  ***  ***
"
740 DATA <end>
```

Listing 14 – !Runimage

```
10 REM >!RunImage (Info14)
20 REM GotoDir
30 REM by Chris Meighan
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 DIM taskid% 4
80 $taskid%="TASK"
90 ON ERROR SYS "Wimp_CloseDown":REPO
RT:PRINT" at line ";ERL:END
100 SYS "Wimp_Initialise",200,!taskid%
,"Go To Dir" TO version%
110 DIM q% &700,temp% &200,buffer% &30
0,endbuf% -1,iconinf% 40
120 SYS "XOS_File",5,"<Goto$Dir>.!Spri
tes" TO ,,,,t%
130 DIM sprites% t%+4
140 !sprites%=t%+4
150 SYS "OS_File",255,"<Goto$Dir>.!Spr
ites",sprites%+4
160 icshow%=FNiconbar
170 SYS "Wimp_DragBox",,-1
180 PROCgetpointer
190 xo%=mousex%
200 yo%=mousey%
210 open%=FALSE
220 REPEAT
230 SYS "Wimp_Poll",1,q% TO reason%
240 CASE reason% OF
250 WHEN 6:PROCcheckmouse(!q%,q%!4,q%!
8,q%!12,q%!16,q%!20)
260 WHEN 7:PROCdrag
270 WHEN 9:PROCmenuselect(q%)
280 WHEN 17,18:PROCreceive(q%)
290 ENDCASE
300 UNTIL FALSE
310 END
320 :
330 DEF PROCreceive(q%)
340 CASE q%!16 OF
350 WHEN 0:PROCfinish:END
360 WHEN 3:
370 IF q%!12=0 THEN
380 SYS "Hourglass_On"
390 PROCscan(FNgetstr(q%+44))
400 SYS "Hourglass_Off"
410 ENDIF
420 ENDCASE
430 ENDPROC
440 :
450 DEF PROCcheckmouse(mousex%,mousey%
,b%,handle%,icon%,ob%)
460 IF (b% AND 2)<>0 AND handle%=-2 PR
OCdomenu(102,buffer%,"Quit","Gotodir",mo
usex%-64,136)
470 ENDPROC
480 :
490 DEF PROCfinish
500 SYS "Wimp_CloseDown"
510 ENDPROC
520 :
530 DEF PROCgetpointer
540 SYS "Wimp_GetPointerInfo",,q%
550 mousex%=!q%:mousey%=q%!4:b%=q%!8:h
andle%=q%!12:icon%=q%!16:ob%=q%!20
560 ENDPROC
570 :
580 DEF PROCerrorbox
590 SYS "Wimp_DragBox",,-1
600 !buffer%=ERR:$(buffer%+4)=REPORT$+
" at line "+STR$ERL+CHR$0
610 SYS "Wimp_ReportError",buffer%,1,"
Tiffs app."
620 PROCfinish:END
630 ENDPROC
640 :
650 DEF PROCdomenu(handle%,menuptr%,me
nu$,menutitle$,x,y)
660 LOCAL dummy%,next%
670 next%=menuptr%
680 menuhandle%=handle%
690 dummy%=FNc_m(menuptr%,menu$,menuti
tle$)
700 SYS "Wimp_CreateMenu",,dummy%,x,y
710 ENDPROC
720 :
730 DEF FNc_m(menuptr%,menu$,menutitle
$)
740 LOCAL i%,call%,item$,w
750 call%=menuptr%
760 w=LEN(menutitle$)
770 next%+=52
780 FOR i%=0 TO LENmenu$
790 IF MID$(menu$,i%,1)="," THEN next%
+=24
800 NEXT
810 i%=0
820 menuptr%!20=40
830 $menuptr%=menutitle$
840 menuptr%!12=&70207
850 menuptr%!24=0
860 menuptr%+=28
870 REPEAT
880 item$=FNpar(menu$,",",i%)
890 menuptr%=FNmenuitem(menuptr%,item$
)
900 IF LEN($(menuptr%-12))>w THEN w=LE
N($(menuptr%-12))
910 UNTIL item$=""
920 call%!16=16*w+12
930 menuptr%!-24=(menuptr%!-24)OR&80
940 =call%
950 :
960 DEF FNmenuitem(ptr%,text$)
970 IF text$="" =ptr%
980 LOCAL a,t$
990 a=0
1000 !ptr%=0
1010 ptr%!8=&07000021
1020 ptr%!4=-1
1030 $(ptr%+12)=text$
1040 =ptr%+24
1050 :
1060 DEF FNpar(a$,s$,RETURN i%)
1070 LOCAL i1%
1080 i1%=i%+1
1090 i%=INSTR(a$+s$,s$,i1%)
1100 =MID$(a$,i1%,i%-i1%)
1110 :
1120 DEF PROCmenuselect(menus%)
1130 PROCfinish:END
1140 ENDPROC
1150 :
1160 DEF FNiconbar
1170 !q%=-1:q%!4=0
1180 q%!8=0:q%!12=63
1190 q%!16=64:q%!20=&2102
1200 spname$="!gotodir"
1210 DIM q%!24 (LENspname$+1)
1220 $(q%!24)=spname$
1230 q%!28=sprites%
1240 q%!32=LEN(spname$)+1
1250 SYS "Wimp_CreateIcon",,q% TO ic%
1260 =ic%
1270 :
1280 DEF FNgetstr(a%)
1290 LOCAL b$
1300 WHILE ?a%>=32
1310 b$+=CHR$(?a%)
1320 a%+=1
1330 ENDWHILE
1340 =b$
1350 :
1360 DEF PROCscan(f$)
1370 LOCAL count1%,dir$
1380 count1%=0
1390 REPEAT
1400 count1%+=1
1410 UNTIL MID$(f$,(LEN(f$)-count1%),1)
="."
1420 count1%+=1
1430 dir$=LEFT$(f$,(LEN(f$)-count1%))
1440 OSCLI("DIR "+dir$)
1450 ENDPROC
```

Listing 15 – Goto_Spr

```
10 REM >Goto_spr (Info15)
20 REM Create sprite for !GotoDir
30 REM Sprite by Chris Meighan
40 REM for 32-bit machines
50 REM (c) BAU February 1993
60 :
70 DIM q% &100,w% &400
80 olen%=&2E0
90 line%=0
100 d$=""
110 i%=0
120 WHILE i%<olen%
130 b$=FNc
140 IF b$>="a" AND b$<="z" THEN
150 off%=-EVAL("&"+FNc+FNc)
160 FOR k%=0 TO (ASC(b$)-ASC"a"+2)
170 w%?i%=w%?(i%+off%)
180 i%+=1
190 NEXT
200 ELSE
210 w%?i%=EVAL("&"+b$+FNc)
220 i%+=1
230 ENDIF
240 ENDWHILE
250 SYS "OS_File",10,"!Sprites",&FF9,,
w%,w%+olen%
260 PRINT"!Sprites created"
270 END
280 :
290 DEF FNc
300 LOCAL c$
310 IF d$="" THEN
320 READ d$,ch$
330 line%+=1
340 $q%=d$
350 SYS "OS_CRC",0,q%,q%+LEN(d$),1 TO
crc%
360 IF crc%<>EVAL("&"+ch$) PRINT"Error
 in data line ";line%:END
370 ENDIF
380 c$=LEFT$(d$,1)
390 d$=MID$(d$,2)
400 =c$
410 :
420 DATA 0100000010a04E4020000D4,5270
430 DATA a0421676F746F646972a170,EC5
440 DATA 004e1Cb0C07a282Ca2C80a3,6776
450 DATA 10Ce14c1B70337737737737,78D
460 DATA 73k1477777777a04i0F0770,48A8
470 DATA 11111111111137f37c3C11E,ECFD
480 DATA F1B01801017e4Ae14AA1B81,FA7A
490 DATA 18f140077b79s3C164j93e3,30D
500 DATA Ap1C77FFFFFFa8BkBFa13a1,F769
510 DATA 67FkD38888888888888878z28,CA8D
520 DATA w3Cr50zABrC0F0d95b9Bq14,A8CD
530 DATA c14b230Fn14p3CF0q1400FF,C255
540 DATA 0Fq50v78fF1c8Cm19bA0dF0,BB85
550 DATA b52g28fBFq14q14z28z50p6,E44
560 DATA 4qB4FF,5B9E
570 DATA *
```

Listing 16 – Ripples

```
  10 REM >Ripples (Info16)
  20 REM by Tim Jones
  30 REM for 32-bit machines
  40 REM (c) BAU February 1993
  50 :
  60 ON ERROR SYS "Hourglass_Smash":MOD
E 0:REPORT:PRINT;" at ";ERL:END
  70 thick=7
  80 xsize=50
  90 zsize=50
 100 xmouse=0
 110 zmouse=zsize-1
 120 zoom=95
 130 shift=20
 140 DIM code &400+(xsize+2)*(zsize+2)*
12+xsize*16+zsize*16+&100
 150 SYS "Hourglass_On"
 160 FOR pass=0 TO 2 STEP 2
 170 P%=code
 180 [OPT pass
 190 .ripples
 200 MOV      r11,#1
 210 .rippleslp
 220 LDR      r0,screen+4
 230 LDR      r9,screen
 240 STR      r9,screen+4
 250 STR      r0,screen
 260 MOV      r0,#112
 270 MOV      r1,r11
 280 SWI      "OS_Byte"
 290 EOR      r11,r11,#3
 300 MOV      r0,#113
 310 MOV      r1,r11
 320 SWI      "OS_Byte"
 330 MOV      r0,#19
 340 SWI      "OS_Byte"
 350 SWI      &100+12
 360
 370 LDR      r4,htbl+4
 380 LDR      r5,vtbl+4
 390 LDR      r6,atbl+4
 400 SWI      "OS_Mouse"
 410 MOVS     r2,r2
 420 BNE      nomouse
 430 MOV      r1,r1,LSL #shift-2
 440 LDR      r2,madr
 450 STR      r1,[r4,r2]
 460 MOV      r1,#0
 470 STR      r1,[r5,r2]
 480 .nomouse
 490 MOV      r1,#zsize
 500 .zlp
 510 MOV      r0,#xsize
 520 .xlp
 530 LDR      r2,[r4,#-4]
 540 LDR      r3,[r4,#+4]
 550 ADD      r2,r2,r3
 560 LDR      r3,[r4,#-xsize*4-8]
 570 ADD      r2,r2,r3
 580 LDR      r3,[r4,#+xsize*4+8]
 590 ADD      r2,r2,r3
 600 LDR      r3,[r4],#4
 610 MOV      r10,r3,LSR #shift
 620 LDR      r8,[r6],#4
 630 ADD      r8,r8,r9
 640 SUB      r8,r8,r10,LSL #6
 650 SUB      r8,r8,r10,LSL #8
 660 ADD      r7,r10,r3,LSR #shift-1
 670 STRB     r7,[r8]
 680 SUB      r3,r3,r2,lsr #2
 690 LDR      r2,[r5]
 700 SUB      r2,r2,r3
 710 STR      r2,[r5],#4
 720 SUBS     r0,r0,#1
 730 BNE      xlp
 740 ADD      r4,r4,#8
 750 ADD      r5,r5,#8
 760 ADD      r6,r6,#8
 770 SUBS     r1,r1,#1
 780 BNE      zlp
 790
 800 LDR      r10,points
 810 LDR      r8,htbl
 820 LDR      r9,vtbl
 830 .mlp
 840 LDMIA    r8,{r0-r3}
 850 LDMIA    r9,{r4-r7}
 860 ADD      r0,r0,r4
 870 ADD      r1,r1,r5
 880 ADD      r2,r2,r6
 890 ADD      r3,r3,r7
 900 SUB      r4,r4,r4,ASR #thick
 910 SUB      r5,r5,r5,ASR #thick
 920 SUB      r6,r6,r6,ASR #thick
 930 SUB      r7,r7,r7,ASR #thick
 940 STMIA    r8!,{r0-r3}
 950 STMIA    r9!,{r4-r7}
 960 SUBS     r10,r10,#1
 970 BNE      mlp
 980
 990 MOV      r10,#xsize/2+zsize/2
1000 LDR      r9,etbl
1010 .elp
1020 LDMIA    r9!,{r0-r7}
1030 LDR      r8,[r0]
1040 STR      r8,[r1]
1050 LDR      r8,[r2]
1060 STR      r8,[r3]
1070 LDR      r8,[r4]
1080 STR      r8,[r5]
1090 LDR      r8,[r6]
1100 STR      r8,[r7]
1110 SUBS     r10,r10,#1
1120 BNE      elp
1130
1140 SWI      "OS_ReadEscapeState"
1150 BCC      rippleslp
1160 SWI      &100+22
1170 SWI      &100+0
1180 MOV      pc,r14
1190
1200 .points EQUD    (xsize+2)*(zsize+2
)
1210
1220 .htbl   EQUD    hblk
1230 EQUD    hblk+12+xsize*4
1240
1250 .vtbl   EQUD    vblk
1260 EQUD    vblk+12+xsize*4
1270
1280 .atbl   EQUD    ablk
1290 EQUD    ablk+12+xsize*4
1300
1310 .etbl   EQUD    eblk
1320
1330 .madr   EQUD    xmouse*4+zmouse*(x
size+2)*4
1340
1350 .screen
1360 EQUD    148
1370 EQUD    149
1380 EQUD    -1
1390 ]
1400 IF pass=0 THEN
1410 hblk=P%
1420 n=128<<shift
1430 FOR x=1 TO !points
1440 !P%=n
1450 P%+=4
1460 NEXT
1470 vblk=P%
1480 FOR x=1 TO !points
1490 !P%=0
1500 P%+=4
1510 NEXT
1520 eblk=P%
1530 FOR x=1 TO xsize
1540 n=hblk+x*4
1550 [OPT pass
1560 EQUD    n+xsize*4+8
1570 EQUD    n
1580 EQUD    n+points!0*4-xsize*8-16
1590 EQUD    n+points!0*4-xsize*4-8
1600 ]
1610 NEXT
1620 FOR z=1 TO zsize
1630 n=hblk+z*(xsize+2)*4
1640 [OPT pass
1650 EQUD    n+4
1660 EQUD    n
1670 EQUD    n+xsize*4
1680 EQUD    n+xsize*4+4
1690 ]
1700 NEXT
1710 ablk=P%
1720 FOR z=zsize+1 TO 0 STEP -1
1730 SYS "Hourglass_Percentage",100-z/z
size*100
1740 FOR x=0 TO xsize+1
1750 !P%=FNadr(x-xsize/2,z-zsize/2,RAD3
5)+&13F68
1760 P%+=4
1770 NEXT
1780 NEXT
1790 ENDIF
1800 NEXT
1810 SYS "Hourglass_Off"
1820 IF xsize MOD 2 OR zsize MOD 2 ERRO
R 0,"Bad dimensions"
1830 MODE 13+128
1840 MOUSE RECTANGLE 0,0,0,1024
1850 MOUSE TO 0,512
1860 SYS "OS_RemoveCursors"
1870 SYS "OS_Byte",112,1
1880 SYS "OS_Byte",113,2
1890 SYS "OS_ReadVduVariables",screen,s
creen
1900 points!0=points!0 DIV 4
1910 screen!8=1
1920 CALL ripples
1930 END
1940 :
1950 DEF FNadr(xx,zz,a)
1960 cos=COS-a
1970 sin=SIN-a
1980 s=400/(zz*cos+xx*sin+zoom)
1990 =(xx*cos-zz*sin)*s-INT(-20*s)*320-
60*640
```

Listing 17 – 1LEatDesk

```
   10 SYS&400C0,200,&4B534154:n=15:DIMx(
n),y(n),o(n),p(n),b 90:x()=512:y()=512:R
EPEATSYS&400C7,,b:FORi=0TOn:GCOL7:CIRCLE
FILLo(i),p(i),12:CIRCLEFILLx(i),y(i),16:
o(i)=x(i):p(i)=y(i):x(i)+=RND(40)-20:y(i
)+=RND(40)-20:x(i)=x(i)AND1023:y(i)=y(i)
AND1023:GCOL15:CIRCLEFILLo(i),p(i),12:CI
RCLEFILLx(i),y(i),16:NEXT:UNTILINKEY-1
```

Listing 18 – 1LSlide

```
   10 MODE7:DIMp 24:REPEAT$p="AXBWCVDUET
FSGRHQIPJOKNLM":q=24:r=q:REPEATp?q=p?r:p
?r=32:q=r:FORc=0TO24:VDU31,c MOD5,c/5,p?
c:NEXT:a=GET:x=q MOD5:y=q DIV5:r=q-(a=90
ANDx<4)+(a=88ANDx>0)+5*(a=67ANDy>0)-5*(a
=70ANDy<4):UNTILa=32ORa=81:UNTILa=81
```

Listing 19 – 1LJulia

```
   10 MODE15:INPUTcx,cy:OFF:ORIGIN600,51
2:FORI%=-600TO600STEP4:FORJ%=-450TO450ST
EP4:ox=I%/300:oy=J%/300:nx=0:ny=0:it%=0:
WHILEnx^2+ny^2<4 AND it%<128:nx=ox^2-oy^
2+cx:ny=oy*ox*2+cy:it%+=1:ox=nx:oy=ny:EN
DWHILE:GCOL128-it%:POINTI%,J%:NEXT,:*SCR
EENSAVE JulScrn128
```

Listing 20 1LMand

```
   10 MODE15:ORIGIN700,512:OFF:FORI%=-70
0TO500STEP4:FORJ%=-450TO450STEP4:cx=I%/3
00:cy=J%/300:nx=0:ox=0:ny=0:oy=0:it%=0:W
HILEnx^2+ny^2<4 AND it%<128:nx=ox^2-oy^2
+cx:ny=oy*ox*2+cy:it%+=1:ox=nx:oy=ny:END
WHILE:GCOL128-it%:POINTI%,J%:NEXT,:*Scre
enSave MndScrn128
```

Listing 21 – Torus

```
   10 MODE0:VDU23,1;0;0;0;0;29,640;512;:
R%=512:REPEATA1=0:A2=0:B1=RND(1)*PI:B2=R
ND(1)*PI:H1=RND(1):L1=1-H1:H2=RND(1):L2=
1-H2:W=TIME+6000:CLS:REPEATA1=A1+B1:A2=A
2+B2:X=H1*SINA1+L1*SINA2:Y=H2*COSA1+L2*C
OSA2:PLOT69,R%*X,R%*Y:UNTILINKEY$(0)<>""
ORTIME>W:UNTIL0
```

Listing 22 – 1LWeird

```
   10 MODE 12:OFF:c=0:FOR r=0TO512 STEP
16:FOR t=0 TO 360:c+=1:GCOL (((c MOD576)
DIV8)MOD15)+1:POINT 640+r*COS(RAD(t)),51
2+(512-r)*SIN(RAD(t)):NEXT,:REPEAT:FOR b
=1 TO 15:WAIT:WAIT:FOR c=1 TO 15:a=((b+c
) MOD 15)+1:COLOUR a,15*c,15*c,15*c:NEXT
,:UNTIL 0
```

Listing 23 – OneKal

```
   10 MODE13:z=256:o=46:SYSo,9:SYSo,15,,
PAGE,,64,64,13:SYSo,29,,PAGE:SYSo,61,,PA
GE:MOVEz,0:PLOT86,z,z:REPEATMOUSEu,v,w:g
=3-g:a=90-a+g*u/z:SYSo,60,,PAGE:CLS:BEAT
SRND(TRUE):FORi=1TO30:GCOLi:b=a+RND(360)
*SGNa:r=(v/4+i*8)MODz:PLOT5+16*w,r*SINRA
Db,r*COSRADb:NEXT:SYSo,60:OFF:f=z:REPEAT
e=z-e:SWAPe,f:SYSo,34,,PAGE,e,f,8:SYSo,3
3-14*(e>f),,PAGE:UNTILf>e:UNTIL0
```

Listing 24 – OSWRCH1

```
  10 REM >OSWRCH1 (Info24)
  20 REM For 8-bit machines
  30 REM (C) BAU February 1993
  40 :
  50 DIM code 100
  60 oswrch=&FFEE
  70 FOR pass=0 TO 2 STEP 2:P%=code
  80 [OPT pass
  90 .hello
 100 LDY #0
 110 .loop
 120 LDA string,Y
 130 CMP #0
 140 BEQ goodbye
 150 JSR oswrch
 160 INY
 170 JMP loop
 180 .goodbye
 190 RTS
 200 :
 210 .string
 220 EQUS "Hello World!"
 230 EQUB 13
 240 EQUB 10
 250 EQUB 0
 260 ]NEXT
 270 CALL hello
```

Listing 25 – OS_WriteS

```
  10 REM >OS_WriteS (Info25)
  20 REM For 32-bit machines
  30 REM (C) BAU February 1993
  40 :
  50 DIM code 100
  60 FOR pass=0 TO 2 STEP 2:P%=code
  70 [OPT pass
  80 .hello
  90 SWI "OS_WriteS"
 100 EQUS "Hello "
 110 EQUB 0
 120 ALIGN
 130 SWI "OS_WriteS"
 140 EQUS "World!"
 150 EQUB 13
 160 EQUB 10
 170 EQUB 0
 180 MOV PC,R14
 190 ]NEXT
 200 CALL hello
```

Listing 26 – OS_Write0

```
  10 REM >OS_Write0 (Info26)
  20 REM For 32-bit machines
  30 REM (C) BAU February 1993
  40 :
  50 DIM code 100
  60 FOR pass=0 TO 2 STEP 2:P%=code
  70 [OPT pass
  80 .hello
  90 ADR R0,string
 100 SWI "OS_Write0"
 110 MOV PC,R14
 120 .string
 130 EQUS "Hello World!"
 140 EQUB 13
 150 EQUB 10
 160 EQUB 0
 170 ALIGN
 180 ]NEXT
 190 CALL hello
```

Listing 27 – WriteList

```
  10 REM >WriteList (Info27)
  20 REM For 32-bit machines
  30 REM (C) BAU February 1993
  40 :
  50 DIM code 100
  60 FOR pass=0 TO 2 STEP 2:P%=code
  70 [OPT pass
  80 .showlist
  90 LDRB  R1,[R0]
 100 CMP   R1,#0
 110 MOVEQ PC,R14
 120 SWI   "OS_Write0"
 130 SWI   "OS_NewLine"
 140 B     showlist
 150 .list
 160 EQUS "Nip":EQUB 0
 170 EQUS "Baby":EQUB 0
 180 EQUS "Magnum":EQUB 0
 190 EQUS "Jeroboam":EQUB 0
 200 EQUS "Rehoboam":EQUB 0
 210 EQUS "Methuselah":EQUB 0
 220 EQUS "Salmanazar":EQUB 0
 230 EQUS "Balthasar":EQUB 0
 240 EQUS "Nebuchadnezzar":EQUB 0
 250 EQUB 0
 260 ALIGN
 270 ]NEXT
 280 A%=list
 290 CALL showlist
```

Listing 28 – OS_WriteN

```
  10 REM >OS_WriteN (Info28)
  20 REM For 32-bit machines
  30 REM (C) BAU February 1993
  40 :
  50 DIM code 100
  60 FOR pass=0 TO 2 STEP 2:P%=code
  70 [OPT pass
  80 .hello
  90 ADR R0,string
 100 MOV R1,#string_end-string
 110 SWI "OS_WriteN"
 120 MOV PC,R14
 130 .string
 140 EQUB 17:EQUB 135
 150 EQUB 17:EQUB 0
 160 EQUS "Hello World!"
 170 EQUB 17:EQUB 128
 180 EQUB 17:EQUB 7
 190 EQUB 13
 200 EQUB 10
 210 .string_end
 220 ALIGN
 230 ]NEXT
 240 CALL hello
```

ASSEMBLY LINE

Listing 1 – ArcAss1

```
  10 REM >ARM1
  20 REM By Dave Lawrence
  30 REM For 32 bit machines
  40 REM (C) BAU February 1993
  50 :
  60 FOR R0=0 TO 4
  70  R1=R0+5
  80  PROCtable(R1)
  90 NEXT
 100 END
 110 :
 120 DEF PROCtable(R1)
 130 REM LOCAL R0
 140 FOR R0=1 TO 5
 150  PRINT ,R0*R1;
 160 NEXT
 170 PRINT
 180 ENDPROC
```

Listing 2 – ArcAss2

```
  10 REM >ARM2
  20 REM By Dave Lawrence
  30 REM For 32 bit machines
  40 REM (C) BAU February 1993
  50 :
  60 sp=13:link=14:pc=15
  70 DIM code 400
  80 FOR pass=0 TO 2 STEP 2:P%=code
  90 [OPT pass
 100 .example
 110          STMFD   (sp)!,{link}
 120          MOV     R0,#0
 130 .loop
 140          ADD     R1,R0,#5
 150          BL      table
 160          ADD     R0,R0,#1
 170          CMP     R0,#4
 180          BLE     loop
 190
 200          LDMFD   (sp)!,{pc}
 210 ;
 220 .table
 230          STMFD   (sp)!,{R0,link}
 240          MOV     R0,#1
 250 .loop2
 260          MUL     R2,R0,R1
 270          BL      print
 280          ADD     R0,R0,#1
 290          CMP     R0,#5
 300          BLE     loop2
 310
 320          SWI     "OS_NewLine"
 330
 340          LDMFD   (sp)!,{R0,pc}
 350 ;
 360 .print
 370          STMFD   (sp)!,{R0-R2,link}
 380          MOV     R0,R2
 390          ADR     R1,buffer
 400          MOV     R2,#8
 410          SWI     "OS_ConvertCardina
14"
 420          SWI     "OS_Write0"
 430          SWI     256+32
 440          LDMFD   (sp)!,{R0-R2,pc}
 450
 460 .buffer EQUD 0:EQUD 0
 470 ]NEXT
 480 CALL example
```

ABSOLUTE BEGINNERS

Get a new look! Paul James shows you how to customise your windows

Are you bored with your windows? Is that huge expanse of grey that is your backdrop getting you down? How about a bit of window dressing?

Take a look at one of your desktop windows; it's made up of several bits, the back icon, the close icon, the title bar and so on. Each of these bits can be altered quite easily so that they look different.

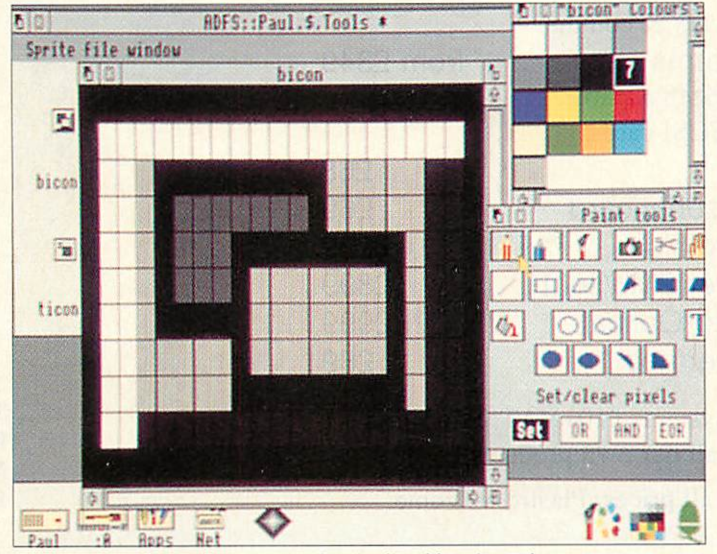
Buried deep within Risc OS are the sprites that make up each window. Press Menu over the Apps icon on your icon bar and click on the Open '$' option that appears. This pops up a window with three folders in it. Now double click on Resources. Up comes a window with tons of folders in it which is where Risc OS 3 gets its information from.

Go right to the bottom of this window using the scroll bar and you'll find a folder called *Wimp*; in here you'll find the two files you are looking for. Drag the sprite files called *Sprites* and *Tools* out onto a fresh floppy disc. It is vital that they are saved on to disc, so that you have a copy of the original system sprites.

Double click on Tools and the file will load into *Paint*. Behold; here are all the window bits, just waiting for you to take a brush to them and make them more interesting. (Risc OS 2 users can get to the tools folder by holding down Shift and clicking on the *!System* folder.)

Which monitor you have will determine which sprites you need to change. If you have a multisync monitor, then the sprites you are interested in are suffixed with 22. Delete any other sprite that has a 0 suffix, no suffix or a 23 suffix.

If you have a TV or a normal monitor – if you use modes 12 or 15 – then the sprites you are interested in have no suffix at all, so delete



Every gadget that makes up a window is alterable using Paint

all the other ones, the ones with 0, 22 and 23 on the end of their name. For the sake of my sanity, from now on we'll ignore the numeric suffix on the end of the sprite names.

Now it's time to make all your sprites three-dimensional; let's start with just one of them. Double click on the sprite called *bicon* (it's short for Back Icon, because that is what it is) and it will appear in a tiny window. Now you'll need to scale this window up, so press Menu over this new window and move over Zoom. Scale it up to about 12:1 using the little arrow in the box.

Press Menu again over this massive sprite and move over the Paint submenu, click Adjust on Show Colours, and Select on show tools. Up pops your toolbox from which you should select the pencil tool which allows you to change the colour of each pixel.

Now take a look at what I've done (above). I've simply made two sides of the square a light grey, and two sides a very dark grey. Do this by choosing the colour from the *Paint* palette that came up on the screen when you choose Show Colours, and then clicking in the sprite to alter the colours of each pixel.

When you've finished that, close the big sprite window, and save the *Tools* sprite file, by pressing Menu over it, and clicking on Save. Now you have to tell your computer that these are the sprites that you want it to use to make up its windows. Press F12 and type:

*Adfs
*Mount 0

These two commands select the floppy disc. Now the magical command . . .

*Toolsprites Tools

. . . will replace the computer's sprites with your new set.

Press RETURN twice. Now when you come back to the desktop your back icon will be three-dimensional; doesn't it make a difference to the feel of your machine?

Now, to make a three-dimensional icon which presses you will need to copy this *bicon* sprite. Press Menu over it, move over sprite *bicon* and over copy, and now add a p to the front of the name so it read *pbicon* and press RETURN. Take a look at the bottom of the sprite file window and you'll find the new sprite in the same way and swap the white and grey side around. Now re-save the sprite file, press F12 and type in the magical toolsprites command again. Now when you come back to the desktop you'll be able to press your back icon.

Of course you don't have to make your icons three-dimensional to make them look nice, how about some nice flowery ones, or how about having windows that look like they are made out of metal or stone; you could even make wooden windows! So send your best window designs in to us and we'll publish the best ones on the monthly disc.

TITLE AND SCROLL

The sprites for these are not included in the *Tools* file found in Wimp Toolsprites. Here is a list of the sprites that make up these parts of the windows. I haven't got room to explain how to create them, so I'll leave you to experiment.

Title bar sprites:
tbarmidt
tbarrcap
tbarlcap
tbarmidb
Vertical Scroll bar sprites:
vwelltcap
vwellt
vbart (only one pixel high)
vbarmid
vbarb
vwellb
vwellbcap

The horizontal scroll bar icons have the same names except they are prefixed with *h* for horizontal. On the subscribers' disc you'll find a tools sprites file for high- and low-res modes.

BACKDROP

There's nothing much to say about this. Drag a sprite file to the grey area behind the windows, press Menu over it and click on Make Backdrop. So how about having a nice view out of a real window behind your windows?

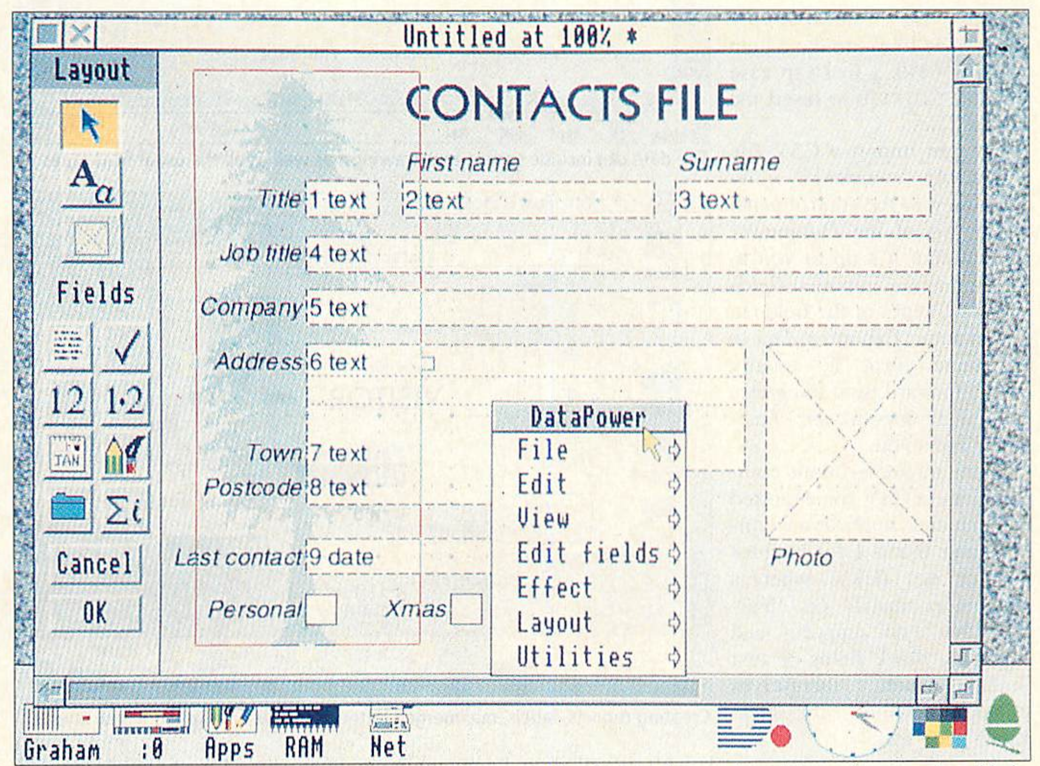
FAST AND FRIENDLY

A database that looks like a DTP package? Graham Bell looks at Datapower, the latest release from Iota Software

Datapower is Iota's new contender to the crown of easiest-to-use flat file database. It claims to alloy database management with DTP reporting techniques, and it aims also to distinguish itself from the competition with a few extra tick-list features like drag-and-drop or a built-in graphs and charts application, and neat gimmicks like a telephone auto-dialler.

Datapower installs easily on any machine running Risc OS 3.1 and fitted with more than a single megabyte of Ram. If you're using a high-resolution screen mode, then the icons used by the application have a pleasant, *Impression*-like, three-dimensional quality, but there is a mode 12 icon set too for people with TV-standard monitors.

Creating a new database is a straightforward process, in essence very much like using *Squirrel*, though, as with any database application you do need to do a bit of pre-planning. A toolbox down the left of the *Datapower* window allows you to choose what type of database fields to draw – text, numbers, yes/no boxes, dates and so on.



Databases are designed in a DTP-like manner with frames and borders. Background graphics and text can be added

FIELD FORMATS

Text fields are not of any fixed length, though when designing the layout you have to specify the total number of lines of text. Two other types of field allow you to store sprites and drawings, or any other file type. In the final release, a last field type will cater for calculated values by allowing you to type in formulae on the layout screen.

Fields can be set to be compulsory, and in the release version, you will be able to ensure an entry is unique. This, however, was not working in the preview version supplied. The fields are drawn onto the screen with the mouse DTP-style, and their field names added. You can pick the style of text and colours as you would expect, and set up a fairly flexible display format for numbers, but in addition *Datapower* supports the use of Poster-style borders to surround fields.

Dates only have a global format – you cannot at present display dates as '16 December 1992' in one layout and '16/12/92' in another – but this should change in the final release version. The program includes a snap-to-grid function to help with field positioning, and also snap-to-frame so you can easily line everything up with the previous fields you have created.

To enhance the look of the database on the screen, you can also add any text you want, plus dummy frames and any sprites and drawings, for example to add a logo. The text could be used to include instructions on how to enter data, making data collection as much like form-filling as possible.

Saving this primary layout creates the database file, and displays the first blank record card. Unlike *Squirrel*, for example, the whole database is stored in a single file, which contains the data itself, the layout design and index data.

LAYOUT LINKS

A single *Datapower* database can include several layout designs, each showing some, or all, of the same data, in different formats.

Creating a new layout design is exactly the same as creating the first, but you mostly use the first as a template. And for each layout, you can show the records one at a time, cardbox-style, or with all the records together in a scrolling list, as if each card in the cardbox were joined together.

You can browse, search or alter the data in either display mode, and you switch between layouts or display modes with a menu selection. A third display is a version of the scrolling list, but laid out ready to print – you can choose the page size, margins and so on – but you can't alter the data.

On any layout, adding and editing the data itself is very simple – particularly if you've used *Impression*. In the control panel part of the *Datapower* window, there are tape-deck controls for browsing through the records, and it also shows the total number of records set up so far.

A *Flexifile*-style button allows you to add new records or delete old ones. For simple fields, you can specify in the original layout a list of all possible values; Mr, Ms, Dr, and so on. These appear in a pop-up menu.

Alternatively, you can set a default value for a field, and the release version will be allow you to specify numerical limits or a formula to check the validity of an entry. Text editing is unexpectedly *Impression*-like – to the extent of using CTRL-S to swap case and SHIFT-CTRL-D to insert the current date.

You can import a CSV file remarkably quickly by dragging it to the control panel to the left of the *Datapower* window, but it's up to you to ensure that the imported fields match the types of the fields in the database. Exporting data in the same form is equally straightforward, so it integrates well with *Pipedream*, *Easiwriter* and so on.

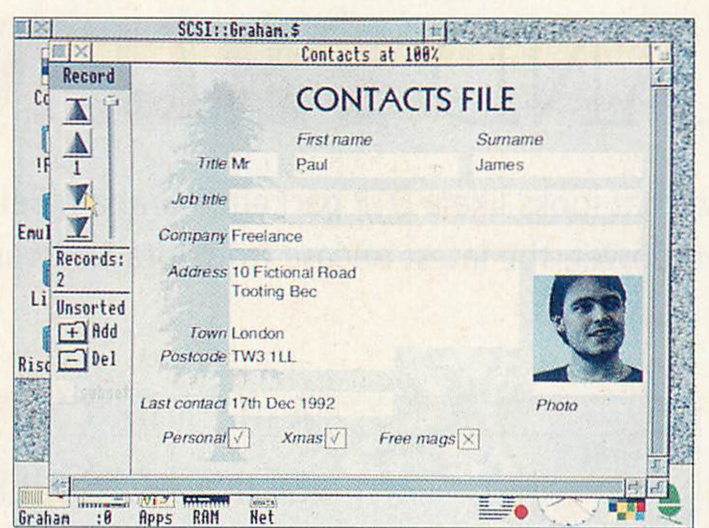
There are some minor complications: a CSV file exported from another application typically uses 0 and 1 for boolean (yes or no) fields, whereas *Datapower* insists on 'Yes' and 'No' on import, and importing blank fields or text fields which themselves include newline characters causes problems.

SORTING OUT

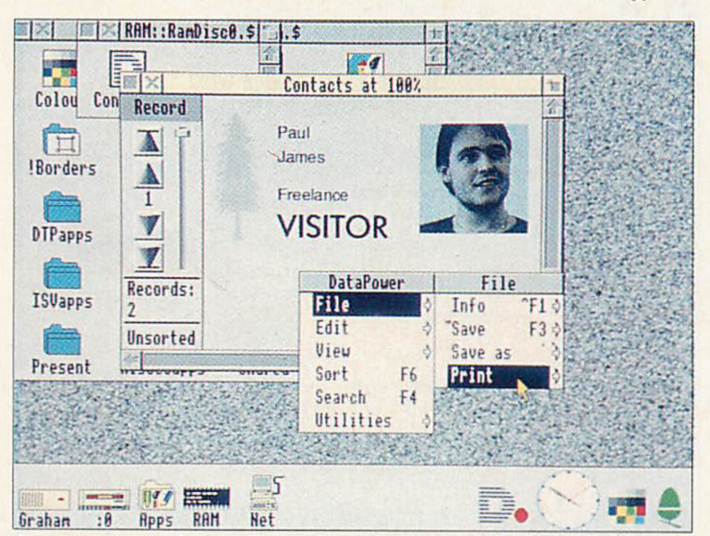
Unlike *Squirrel*, but like more conventional databases, the various records of the database are naturally displayed unsorted – or more correctly in their order of entry. Sorting the database is a menu option, and you can select fields for both the primary and secondary keys, and sort the records in number, date or dictionary (not Ascii) order.

However, you can't sort on boolean fields, so a printout can't include all the yesses first. The sort takes a few seconds on any sizeable database, which means that changing the order of the records and browsing is less convenient than it could be. And on the preview copy supplied to us, it isn't possible to keep more than one index.

If you have two layouts for the same data, it's easy to switch between the two, but it isn't possible to keep one in one order and another sorted differently. However, on the release version that should be possible: Iota intends that sort orders be specified as part of the layout design.



The data can include sprites and drawings, as well as all the usual field types



Creating reports, labels, mailmerged letters is just like designing a new layout

The benefit of this is in reduced file size; substantial *Datapower* databases are much smaller than those of its competitors, both because less index information has to be stored, and because the data is automatically compressed as it is saved.

There are a couple of neat touches in the browsing too, for example CTRL-D tone dials a number in a field (and holding the phone handset near the Arc's speaker works).

Iota has included a wonderful drag-and-drop feature, as used on some of the most modern Microsoft PC applications: you can highlight a field, or any part of a field – using a double-click to highlight a word for example, or a triple-click to highlight a line of text – then just drag the highlighted section to somewhere else.

Another field, another record, another application like *Edit*, even straight to disc. They all work, and it's much easier than copying and pasting in separate operations. The real benefit of *Datapower* is in highly formatted reporting; although 'reporting' seems to be the wrong description. The tabular material that is associated with databases isn't what *Datapower* is good at.

TABULAR REPORTS

It is possible to produce tabular reports, with main headings and headings on each page, and these are particularly flexible as they are designed using the same tools as the layouts. You can include any combination of text and graphics, plus fields in the headers and footers too, to provide running counts, totals, minima, means and maxima.

But, because you can't automatically produce a hierarchical series of sub-headings, *Datapower* isn't really suited to this sort of 'database publishing'. Rather, it aims to integrate the database with DTP-style page layout tools; exporting data to a word processor is often unnecessary, as you can design the final product in *Datapower*.

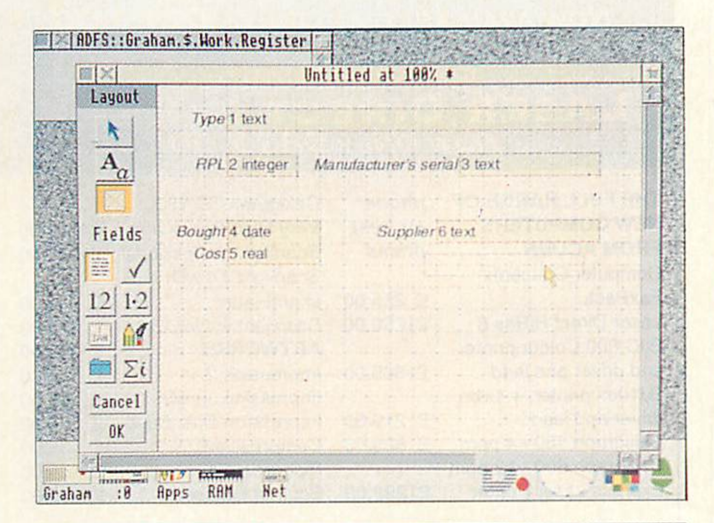
A report is simply another layout, created with all the usual DTP-style tools: there is no real differentiation between the normal 'cardbox' presentation of the database and a report, as both can incorporate any fixed text, colours, borders or illustrations, and any or all of the database fields. And because you have a lot of flexibility in designing the report, this could be a set of labels, or a set of letters, or a set of highly graphical invites, certificates . . . *Datapower* is a really well integrated package in this area.

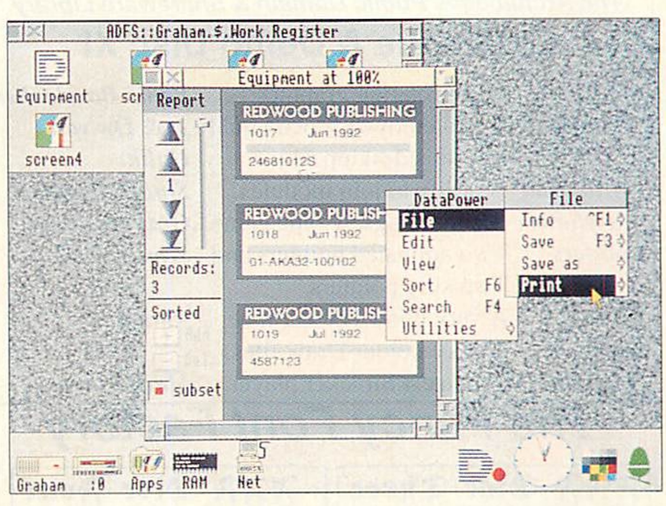
Reports and layouts of any form can be applied to the whole of the set of records, or a sorted set, if you specify the sort order. Alternatively, a subset of the records in the database can be specified through the Search menu option. This again works by a process of form filling; you type into a blank record the criteria that you require; 'Date > 1.12.91' and 'Manufacturer = Acorn' for example, then press the Go button.

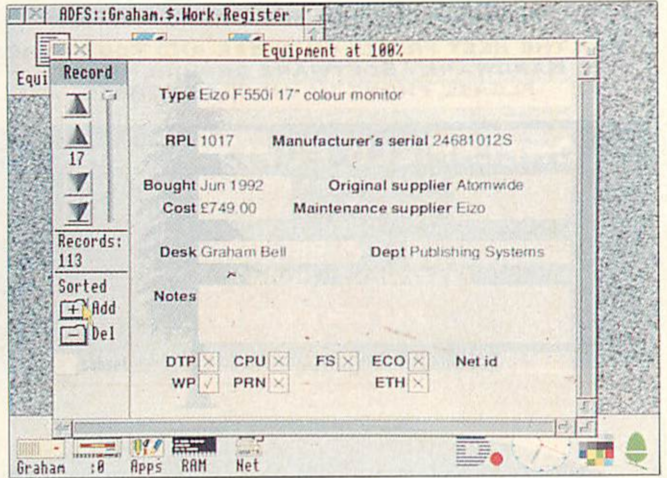
The subset is selected, and you can progressively refine or add to the subset using a second and third set of search criteria. It is simple, but it's not always obvious what criteria you have to apply, and in what order, particularly if there's a sprinkling of ANDs and ORs involved. Nothing is quite as simple as *Squirrel*'s 'plumbing diagram' when it comes to complex selections, and here *Datapower* is adequate but no more.

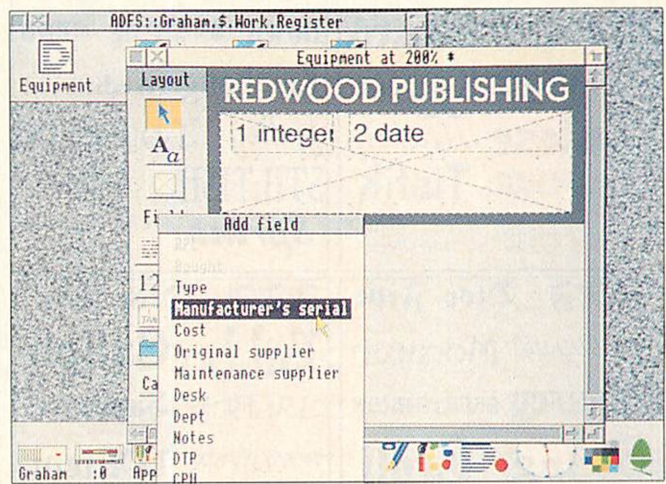
GRAPHS AND CHARTS

The final section of *Datapower* is its integrated charting. From most databases, producing a graph is a rather complicated affair: it would involve setting up a report,









1) Setting up an equipment register. Some are text fields, others serial numbers. The RPL field is unique, so each item is uniquely numbered

2) The layout is complete, with a series of boolean fields to identify the equipment type. A scanned sprite is used to spruce up the background

3) The database in use, recording details of computer equipment

4) A second layout design is used to create labels to stick to each item of equipment. This records the unique RPL number, the purchase date and manufacturer's serial number.

with a special set of calculated fields, then editing the report file, and exporting it to a separate charts package.

With a *Datapower* database, a chart can be produced by choosing the Graph option from the menu, selecting which fields are to be the X and Y axes, and clicking on the Draw button. This is quick and really natural-feeling: *Datapower* has to get full marks here. The charts range through bar, scatter, pie and line graphs and frequency charts, in both two and three-dimensional styles, but there's only limited control over the finer details; you can't change colours or the shape of the blobs used to denote data points for example.

However, certain elements of the graph layout do remain editable, so you can select some text and change the words, typeface or size, before printing, saving as a drawing or saving in Acorn's newly-defined Graph file format

It is intended that this new format be supported by other Graphing applications, so you'll be able to take the graph data and re-draw it in a more sophisticated, dedicated package like *Graphbox* or *Chartwell* if it's necessary.

The key word in describing *Datapower* has to be 'integrated', but 'seamless' and 'consistent' also suggest themselves. Although, in the preview version, the organisation of the menu structure is not as consistent as it should be, this is being re-organised before release. The consistency arises from using the same tools to design your database, change the on-screen layout, or design a report.

Other database managers separate design, browsing and reporting much more strongly, offering different degrees of control in each mode. *Datapower* is less modal in its approach.

CONCLUSION

At present, and particularly in the copy supplied for this preview, *Datapower* lacks some of the major features of rival database managers. There is no networked client/server version as yet, nor a programming language to allow the development of custom applications. And *Datapower* isn't in any way 'relational'.

Neither is any other Archimedes database, of course, at in the strict sense. But at least with the *Squirrel* database for example, you can generate reports from data, spanning more than one table. Iota does plan to develop these features for *Datapower* in due course.

With its projected price of £149 excluding VAT, or £347 for a ten-user site licence, there is some strong and relatively established competition for *Datapower*. The obvious existing competitors are Digital Services' *Squirrel* and Minerva's *Flexifile*, but there will also be Beebug's forthcoming Risc OS version of the long-established *Masterfile* database manager.

However, Iota's new flagship database does have some attractive ease-of-use features such as drag-and-drop. Add to this its general structure and uniquely fluid DTP-like feel, and *Datapower* will doubtless attract plenty of support.

PRODUCT DETAILS

Product: Datapower
Description: Flat file database
Supplier: Iota Software, St John's Innovation Centre, Cowley Road, Cambridge CB4 4WS
Tel: (0223) 421542
Prices: Single-user – £149
Ten stations – £347
Any number of stations; £599

EASY PC

Ian Burley boots up Aleph One's 486 card, the fast route to PC emulation

Compatibility with a personal computer standard that was first devised by IBM and Microsoft 13 years ago has never been so important. Acorn has invested heavily in a sofware PC emulator for its proprietary Risc computer platform, which can outperform the original IBM PC in many respects.

Although it was recognised by many as a remarkable effort, the *PC Emulator* was never going to satisfy the needs of a sizeable number of potential users.

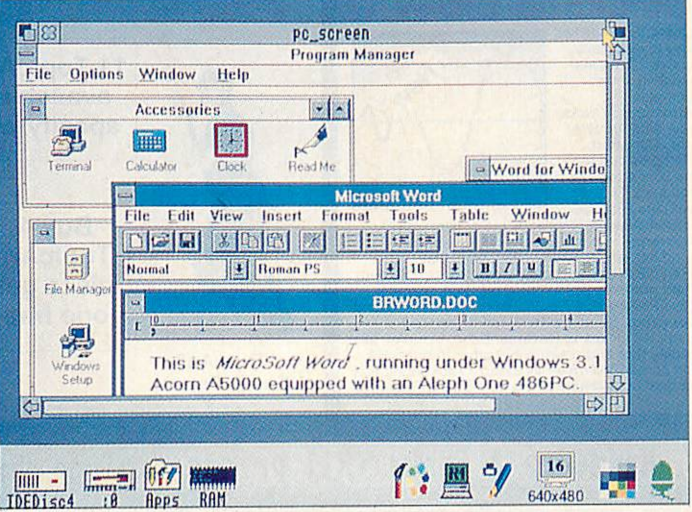
THE HISTORY

At the launch of the Archimedes in 1987 and, following in the footsteps of a similar device for the BBC Master 128, a PC-compatible co-processor expansion card was promised. This was eventually abandoned by Acorn, but meanwhile the PC standard was becoming more established.

Along came Aleph One to take up where Acorn had stopped. *BAU* reviewed Aleph One's first PC card, which was based on the Intel-compatible 386SX processor, in May 1992. Malcolm Brown then reported that Aleph One's solution ingeniously integrated into Acorn's Risc architecture, but questioned its cost. And in those early days compatibility was also an unknown quantity.

In the year that followed, Aleph One made certain improvements. They made the 386SX faster by 25 percent when the original 20MHz chip was replaced with a 25MHz version.

You now get 4Mb of Ram instead of 1Mb – for £20 less – and there have also been many improvements to the system support software, including the recent introduction of dedicated Microsoft Windows drivers.



Aleph One's 486 PC card is the latest in PC compatibility

The latest Aleph One development in the PC stakes is the new 486 card.

THE 486 CARD

Aleph One claim that their new 486 card, based around a Cyrix chip, can double the performance of their 386 PC card, although, as always, such claims are difficult to verify.

In the PC world, the 25MHz Cyrix 486SLC is generally thought to be about twice as fast as a 25MHz 386SX in typical use. The 25MHz Cyrix 486SLC chip used by Aleph One is software-compatible with Intel's original 486, but there are some key hardware differences. First of all, the Cyrix 486 makes do with a 1K on-chip cache compared to the Intel's 8K. To put it simply, if a software routine doesn't fit inside the cache, then processor cycles will be wasted and performance is affected.

Secondly, an Intel 486 has a 32-bit address bus, whereas the Cyrix 486SLC is designed to be pin-compatible with the 16-bit 386SX, meaning some memory-intensive operations will take twice as long. The Cyrix has no built-in maths co-processor, but the Aleph One card has a socket for an external one if required.

IN USE

Microsoft Windows has taken the PC world by storm in the last 18 months. *PC Soft*'s main failing is its lethargic graphics, and it is now incompatible with the latest version 3.1 of Windows. So if you want to run Windows on your Acorn; realistically, you need Aleph One hardware.

I expected much of Aleph One's new Windows graphics drivers. Many PCs now have graphics accelerators to improve the poor screen performance, but on Acorn machines the native processor is already ideal for fast graphical operations.

In practice, Windows on the Aleph One card is perfectly usable but not noticably better than an average un-accelerated 386SX PC clone. This conclusion was backed up by a Windows benchmark. I can't help hoping that Aleph One may be able to make dramatic improvements in this area. Indeed the company admit that, at present, only a subset of Windows graphical operations can benefit.

In ordinary Dos mode, programs looked very crisp and graphical performance was perfectly respectable.

To date only a few software incompatibilities have been found and Aleph One work hard to solve the compatibilty problems its customers come up with. To the company's credit, the success rate so far is 100 percent.

TO THE FUTURE

Developments are continuing. Aleph One hopes to solve the limitation of 4Mb of Ram on its current design by introducing a Mk2 design accommodating up to 16Mb of Simms memory. There is a strong feeling that Windows printer drivers for Computer Concepts and Calligraph direct drive laser printers should be with us later in the year.

Other device drivers to make external peripherals look like PC peripherals are being developed, and third parties will be able to develop their own by using a developer's toolkit from Aleph One. A mini-podule for A3000 and A4000-series machines is also in the pipeline.

CONCLUSION

If you're a PC power-user, you need a 'real' PC. But for a surprisingly high number of existing Acorn users, Aleph One's PC Cards, and especially the 486 version for just £100 extra, are becoming the most viable solution.

PRODUCT DETAILS

Product: PC Emulator card
Supplier: Aleph One Ltd, The Old Courthouse, Bottisham, Cambridge, England, CB5 9BA
Tel: (0223) 811679
Price: 1Mb Ram – £495
4Mb Ram – £595 + VAT

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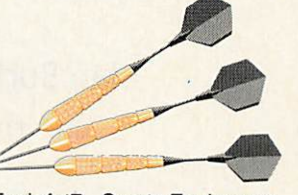
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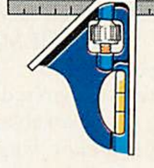

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A5000	£68

The above must be purchased at the same time as the computer system. Call for further details.

QuickSnd £10+VAT

QuickSound allows you to load, play, convert & resave existing sound samples. Armadeus, Tracker, raw data formats are supported. Samples can also be converted into modules for use with the RISCOS sound system, Rhapsody etc or alternatively converted into stand alone Utility sample modules which when called, via a star command, automatically plays the sample and then removes itself completely from memory (this feature is not available on any other sound package). Special effects can be applied to samples including Reverse, Echo, Max Vol, alter replay rate and resample at other frequencies. On screen VU meter included. QuickSound is a perfect compliment to the Oak Sound Recorder.

Hardware & Books (All prices exclude VAT)

New Pocket Book
Acorn Pocket Book £212
A -Link for above £51

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Limited Special Offer £549
A3010 Family Solution + Acorn Colour Monitor

Family Solution £424
Connects to std TV. 1Mb RAM, Floppy drive, 2 joystick ports.
With 2 Free Joysticks

Learning Curve Sys £680
As above with 2Mb RAM, Standard Monitor & Learning Curve software.
Free SWIV & 2 Joysticks

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As above with 60Mb Hard disc.
Add £50 for MultiScan Monitor.

New A4000 Series
With Free PC Emulator

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Add £50 for MultiScan Monitor.

New A5000 Series
With Free Canon BJ-10ex

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A3000 2/4Mb RAM	£45/£129
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A5000 2Mb RAM	£79
A400 1Mb RAM	£35
A400 2Mb RAM	£65
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Canon BJ-10 Turbo	£219
Canon BJ-10 ASF	£49
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Canon BJ-300	£339
Canon BJ-300 ASF	£99
Canon BJ-330	£399
Canon BJC-800 Turbo	£1479
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Citizen Swift 240C	£259
Citizen Swift 24 ASF	£75
HP DeskJet 500	£299
HP DeskJet 500C	£379
HP DeskJet 550C	£469
LaserDirect HiRes4	£949
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Canon BJC Turbo Driver	£99
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RISCOS 3.1 A300	£63.83
RISCOS 3.1 A5000	£16.17
RISCOS 3.1 Others	£42.70

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A3000 Technical Guide	£29.95
A540 Technical Guide	£65.00
A5000 Technical Guide	£65.00
BBC Basic Guide	£19.95
RISCOS2 PRM's	£79.00
RISCOS3 PRM's	TBA
RISCOS2 Style Guide	£9.95
1st Word+ Manual	£10.00
Desktop Dev Env Guide	£25.00
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ANSI C v4 Manual	£25.00

Other Books

Archi Game Maker's Manual	£14.95
Archi Assembly Lang Manual	£14.95
Archi Operating System Guide	£14.95
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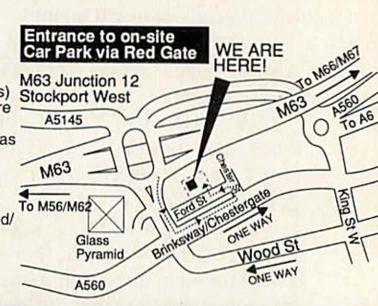
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Unit 2A, Heapriding Business Park, Ford St, Stockport, Cheshire. SK3 0BT



Opening Hours Monday-Saturday 10.00 to 18.00

QuickShow £25+VAT



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Flopticals / CD-ROM Multimedia

A3000/A5000/A300/A400 External Floptical (without SCSI card) **£399**
The above must be used with an Acorn compatible SCSI card.

A5000 Internal Floptical kit (with Econet SCSI card) **£359**

Floptical floppies (20Mb) **£20**
Each of the above systems comes complete with one floptical floppy.

Cumana CD-ROM Multimedia Pack **£699**
Comprises CD-ROM drive, SCSI card, stereo speakers, 6 RISCOS CD-ROM titles, The Hutchinson Encyclopedia, Dictionary of the Living World, Revelation 2, The Illustrated Holy Bible, The Illustrated Works of Shakespeare, Sherlock Holmes on a Disc, !CDPlayer, 3 caddies, etc.

Cumana CD-ROM Software Pack **£299**
As above without CD-ROM Drive and SCSI card

Cumana CD-ROM Drive without SCSI Card (Sony Device) **£429**

Cumana CD-ROM Drive with SCSI Card (Sony Device) **£549**

Hard Discs

IDE

The following are complete HardDisc Systems comprising of IDE disc controller, HardDisc, mounting brackets, cables, utilities disc and manual.

Archimedes Internal
Archimedes Internal hard discs. Not suitable for the A3000

40Mb 17ms	£199
120Mb 16ms Cache	£299
200Mb 13ms Cache	£399
330Mb 12ms Cache	£699
520Mb 12ms Cache	£899

A5000 Exchange Drives
These systems are only available for the A5000 only.

120Mb 16ms Cache	£200
200Mb 13ms Cache	£300

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200Mb 13ms Cache	£479
330Mb 12ms Cache	£779
520Mb 12ms Cache	£979

A3000 Hard Cards

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A3010 Hard Cards

20Mb Internal	£269

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20Mb Internal	£269
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SCSI

The following are complete SCSI HardDisc Systems comprising of a Morley SCSI interface, HardDisc, mounting brackets, cables, utilities disc and manual.

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105Mb 18ms Cache	£429
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330Mb 12ms Cache	£899
520Mb 12ms Cache	£999

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520Mb 12ms Cache	£1049

Removable Hard Discs

44Mb (Inc one cartridge)	£499
44Mb Cartridge	£55
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88Mb Cartridge	£99

The above are external units with SCSI card.

SCSI Controller Cards

Morley Uncached	£139
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Archimedes, A3000, A5000 Software

Applications

3D Construction Kit (Domark)	£38
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Alphabase (Clares)	£37
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GAME SHOW

We begin this month with news of *Battle Chess*, that infamous attempt to liven up the age-old game of chess, familiar to 16-bit computer owners left, right and centre. If you are put off chess because there are no aliens or lasers, no power-ups, and certainly no spaceships, then the release of this latest 3D conversion from Krisalis might be just what is needed. Pieces are dealt with in a manner not winessed since the last Arnold Schwartzenegger movie. No sooner has the doomed knight realised the strategic consequences of his player's loss, than he is grabbed around the throat by the ogre rook, lifted off his square and greedily devoured, never to be noble again.

The bishop's fate is even quicker. In an instant, a flash of lighting flies forth from the queen's outstretched finger and what was once humble is now a pile of ashes.

Pitched Battle Chess would perhaps be an even more appropriate title for the game, to be released in March, in which each piece has its own devious means of annihilation.

WIZARD TRICKS

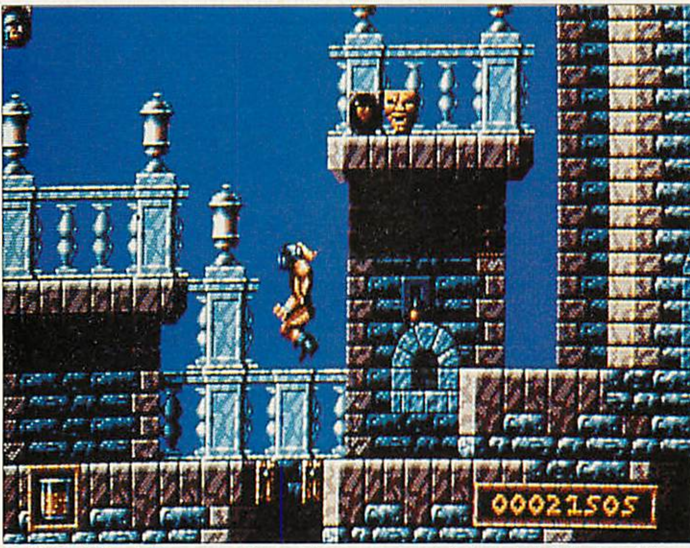
Extra lives; infinite shields; jump to any level; find passwords for any level; slow the game down by any amount . . . on any game.

These are just some of the features of *The Games Wizard*, a new piece of software that runs in the heart of the computer, alongside whatever game you're playing. For instance, in *Gods* an added save-game feature can be used to help out the deity. This application does for the Arc what many hardware-based devices do for Atari and Amiga owners but at a vastly reduced price. Leading Edge is on (0532) 458800.

DEAD OR ALIVE?

'So you thought classic text adventures were dead?'

This is the challenge from Topologika, producer of text adventures for the Acorn range. Topologika has just produced a small catalogue of its adventures, from *Countdown* to *Doom* and *Return to Doom*, to *Kingdom of Hamil* and its latest release, *Spy-Snatcher*, reviewed this month. For a copy of the catalogue, write to Topologika, PO Box 39, Stilton, Peterborough, PE7 3RL.



As if God-like status was not enough: now you can have a helpful wizard too

PLAY IT AGAIN . . .

Superior Software is in the process of formulating the line up for its next *Play It Again Sam* for 32-bit computers. So far the compilation, which will be ready by Easter time, looks set to contain *Arc Pinball* and *Repton 2* among other things. *Repton 2* has never seen the light of day on Acorn 32-bit before but will be converted from its eight-bit form by the same author who did *Repton 3*. *Arc Pinball* was released about three years ago by Shibumi, but it never made much of an impact. But, by Easter, purple bananas will have gone rotten and *Play It Again Sam 2* will be on the shelves.

It is now also certain that Superior will be releasing *Technodream*, the horizontally scrolling shoot-em-up that was once *Nevryon 2* from The Fourth Dimension.

Technodream is due to hit the shelves towards the end of February and is the sequel to *Nevryon*, which was probably the best horizontal shoot-em-up when it came out two years ago. The sequel features one- or two-player zapping, large animated baddies, bags of power-ups and vertical, as well as horizontal, scrolling.

COMPETITION

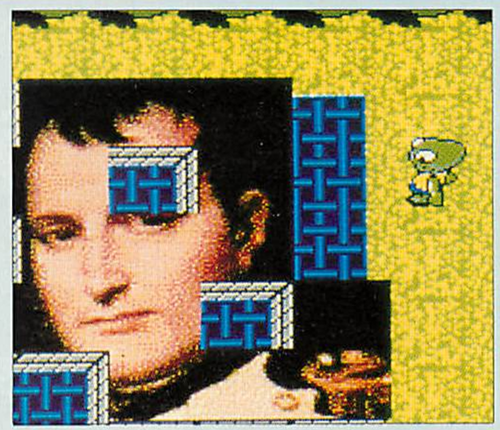
Ego is the latest 32-bit game from Superior Software. (see our review on page 127) and to mark the occasion, we are running a special competition. The prize is the complete '*Ego* bundle' containing a copy of the game together with a *Repton* pen and ruler.

Ego is a significant arrival since it is a rare example of a game available on all formats . . . but released first for the Acorn range. Amiga owners will just have to wait!

It is also slightly different from the 16-bit versions in that the hero is not an elephant but a repton, the creature that nostalgic BBC owners will remember with a smile.

Repton was the standard-bearer of all puzzle games, being a lovable green lizard who roamed around in search of various 'collectables', such as diamonds or keys and now, in *Ego*, puzzle pieces, as the learned lizard strives to put together puzzles of famous people and places, using its own peculiar intellect to re-create such famous works of art as the Eiffel Tower, the Mona Lisa and, perhaps not quite so aptly, John Major.

To win a Repton *Ego* bundle all you have to do is answer the three simple questions opposite and send them on a postcard or the back of a sealed envelope to: Ego Competition, BBC Acorn User, 101 Bayham Street, London NW1 0AG, before 1 March 1993.



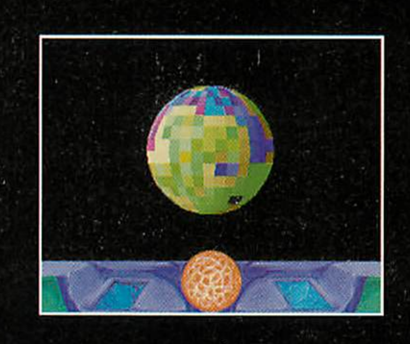
The first five correct entries out of the hat will receive a copy of *Ego* for all Acorn 32-bit computers, a Repton pen and a Repton ruler.

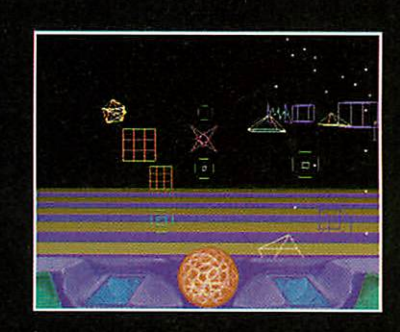
QUESTIONS:

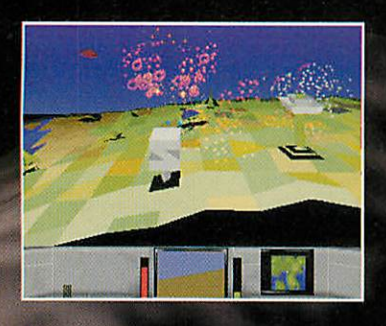
1 Name the famous person in the screenshot shown here from *Ego*, in which Repton is halfway through piecing together the pictures.
2 Where in England is the town of Repton?
3 Which issue of *BBC Acorn User* marked the first appearance of the Repton character?

ALDEBARAN











ALDEBARAN is a comprehensive game mixing Action and Strategy. Several completely different scenes including :

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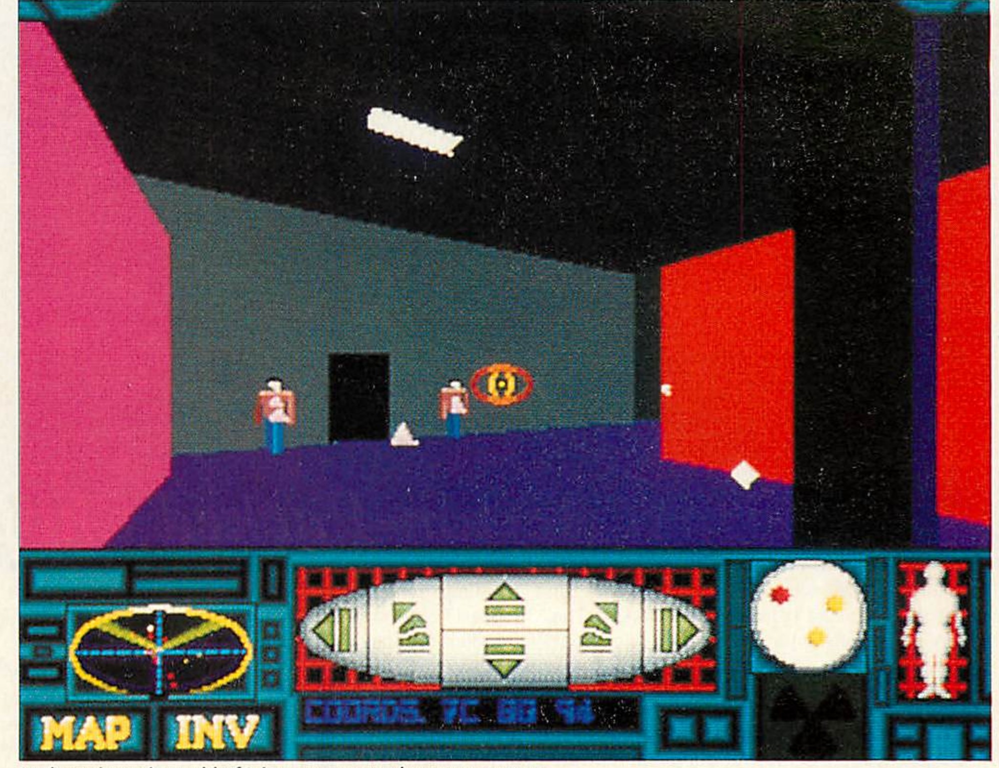


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IXION

Software 42
109 Ferry Road, Hullbridge, Hockley, Essex SS5 6EL
£25.00
Risc OS machines



In the enigmatic world of Ixion, no-one can hear you scream

Ixion is an adventure like nothing else on the Acorn games scene. You view the world as any ordinary six-foot human would and walk around by clicking the mouse pointer over arrow buttons which appear alongside several other buttons and indicators on a panel in the lower portion of the screen.

At first this is tricky, so you begin the game wondering why on earth the programmers didn't provide some keyboard alternatives. But after a while it gets a lot easier and it is nice to control virtually everything using only the mouse.

Wandering round *Ixion*'s 3D, solid graphics city is slow and painstaking. It is a tad scary. Around every next corner could be something horrible, a something as grey and uninviting as the city itself and a something that is not at all pleased to see you.

This is why the vehicle is enormously welcome. In the car the city is suddenly accessible and the protection of its chassis and speed makes it a real comfort as well.

Only brief exploration was needed before I realised that many of the buildings have – surprise, surprise – doors. Park the car, anywhere will do, and in though the door I go. Now there were corridors and rooms and, in the rooms, furniture and objects to collect. Some money, a pass card, even a brown paper bag of food left carelessly on a table in the dining room. I even found some shades I could wear, though everything was a bit too dark then.

Up in the lift and into another corridor. This time somebody was there. I clicked on him and immediately entered 'conversation mode', in which a small digitised picture of his face came up on the screen and the words, 'Looking for a job' appeared on the screen. He was easy to converse with but I needed to find a translator before talking to the alien in the next room.

In the pub, the woman at the bar could learn a bit of etiquette but the barman served me, without effort. He fixed me up with a snake byte which I downed in one and regretted immediately as the world swayed round before me. Driving after that was particularly precarious.

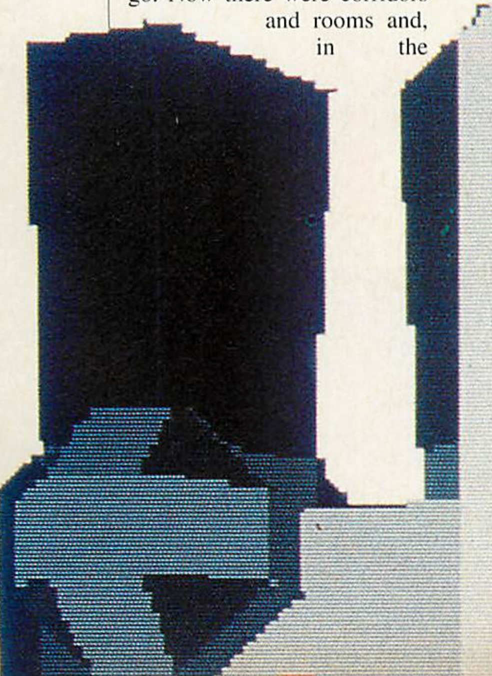
In one building, two guards said they had been given a large pile of money not to let anyone by so I rushed past and escaped before their bullets killed me. Elsewhere, you need to fight the guards and this means a Western-style firefight; hiding behind walls and coming out to shoot, then finding the guards have sneaked round a different way. I tell you, adrenalin really flows. The object of the game is pretty simple. You are trapped on a prison planet surrounded by a radioactive field and you would really quite like to escape. The game develops as you find the pass cards which grant access to another building or room, where a whole new complex is there to be explored. In the huge factory there are packages flying along a production line and more lifts. Some rooms contain radioactive substances so a few radiation pills need to be taken first, while others have computer terminals.

Ixion really is something new. To pigeon-hole it as an arcade adventure would be unfair, because it is a step away from the usual graphic adventures, where text and a static picture describe the view, and a step into virtual reality. You explore with your own eyes, experiment with your own hands (using the mouse pointer) and experience a genuine fear for survival; you only have one life.

If I have one gripe it is that one life is all very realistic, but a bit annoying when, after hours of work, you bump into an unsavoury character who blasts you straight back to square one. A save-game feature would not go unappreciated.

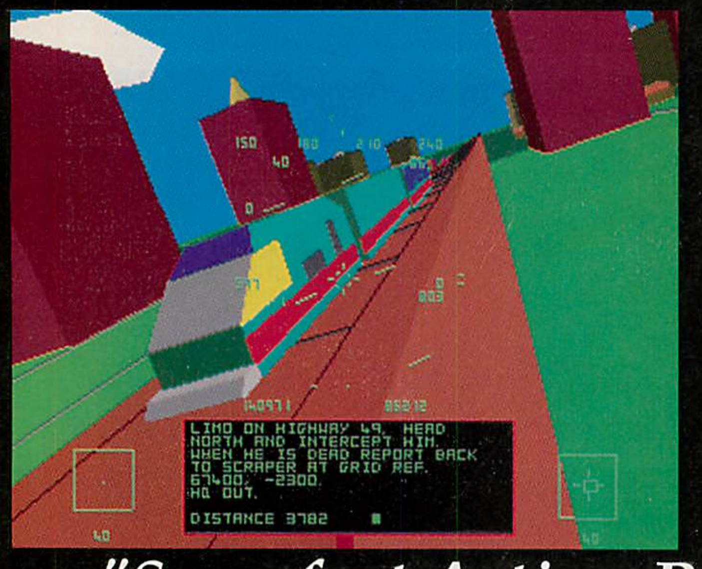
The atmosphere of *Ixion* is unique. Buy it. Buy it now.

Sam Greenhill



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RANKING SYSTEM

As you climb through the ranks extra equipment will become available. You will also gain privileges such as access to satellite surveillance. Ranking credits will be given for destroying any terrorists that are about when you do your mission as well as for achieving specific objectives.

Ranking debits are given for friendly-fire or civilian casualties that you may cause. To improve your rank you may redo a mission to try and get those terrorists that were missed the first time. Each player has his/her own personal file protected by a password that records what you have achieved so far.

LARGE MAP

The whole game takes place in one gigantic arena with a superb variety of buildings, roads, rivers and other objects. There are over 20 fascinating and varied missions that will test even the most experienced flight simulator fans.

STUNNING SOUND

A large variety of samples have been recorded at a high quality sample rate. The doppler effect is fully implemented just as it would really sound. The volume is correctly calculated using the inverse square law.

SUPERB GRAPHICS

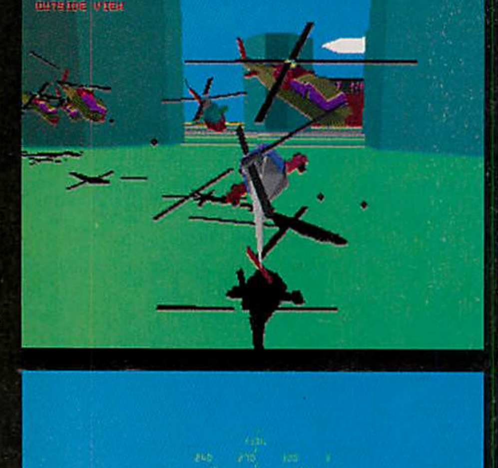
More polygons than ever before are seen at a smooth frame rate. And yet the vector code is extremely flexible, allowing views from EVERY conceivable angle which is made use of with an impressive list of view/tracking facilities.

COMPETITION

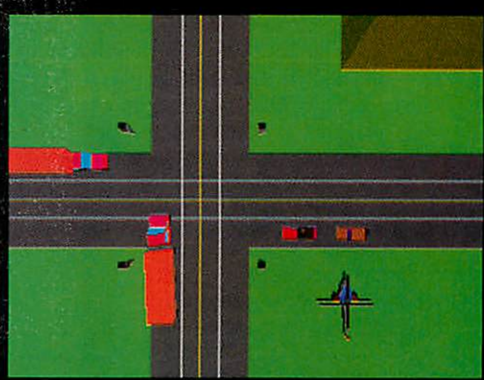
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EGO: REPTON 4

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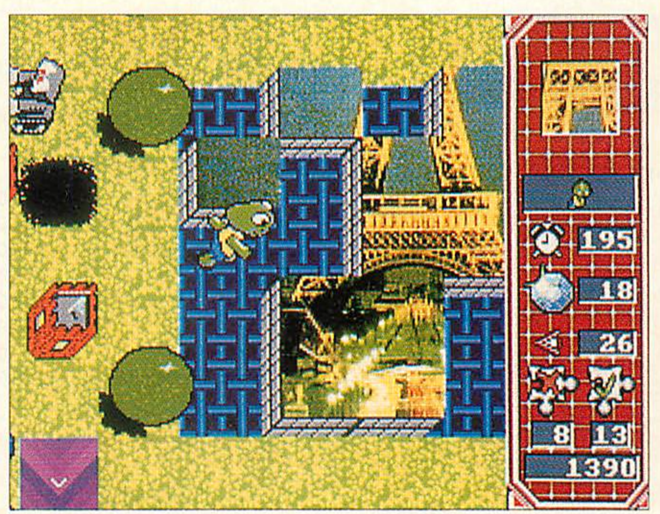
Repton rides again in this, his eighth incarnation in as many years. In some ways we're back to *Repton 2*, since our hero assembles a series of jigsaws, but there the comparison ends. Here, over a total of 30 increasingly difficult levels, he must find the pieces of each level's 5x5 jigsaw.

Sounds easy enough, but life is made complicated by the long, slippery tunnels which will slide you to a predetermined location if you step into one, much as in the BBC game *Pipeline*.

There are also mean-looking psychotic androids who doggedly guard some of the pieces, as well as transporters to beam through and gems to collect. Some of the gems are hidden in the background scenery and only become apparent when you touch them, while others that look like a single gem can contain up to 20 on the same spot. Also dotted around the landscape are mushrooms – which can have any of four different effects – as well as holes into which it's all to easy to drop if you don't look where you're going. In fact, things are not at all what they seem; areas of forest dissolve before your eyes as you enter them to reveal a hidden pathway.

Getting all this collecting and assembling done inside the time limit is harder than you might imagine, and brings back that *Repton* frustration of yesteryear. The jigsaws are an amusing selection of famous people and places – ranging from John Major (in glorious monochrome . . . sorry, 256 colours) to the Sphinx, with several works of art thrown in for good measure.

The final level is a fiendishly intricate and subtly shaded da Vinci cartoon, and the authors reckon this last one will take a chess grandmaster 'at least five hours' to complete. The logical puzzles for which the *Repton* dynasty is justly renowned are here in abundance, and I frequently found myself stuck in a corner with the last piece of the jigsaw in my hand, but with nowhere to go.



Ego: the dark sprite returns

There is less of a variety of game objects in *Ego*, which might not be what you'd expect from an all-new *Repton* release, but this is more than made up for by the innovative jigsaw theme. I must confess that I did miss the falling boulders from the other games – in many ways they were *Repton*'s trademark.

Graphically, the game is along the same lines as previous *Repton* generations, only smoother and with better artwork. The main scrolling area is rather squashed, one of several tell-tale signs that this is in fact a customised *Repton* edition of a 16-bit game.

It's nice to see trusty Beeb coders Gary Partis and Peter Scott back on the Acorn games scene; look out for more Arc releases from Gary's new company, Utopia. *Repton* enthusiasts will be pleased: this is a must for fans of all things green and scaly.

Mathew Tizard

SPYSNATCHER

Topologika
Tel: (0733) 244682
£19.95
Risc OS machines

SpySnatcher is a tale of espionage and corruption in MI7. You've been asked – unofficially of course – to find the mole who leaked the plans for the sonic macrothrodule. The offices are deserted at the moment, but you must avoid any and all contact with the 'legitimate' occupants in your search for clues.

There are codes to break, safes to open, files to read, computers to access, tapes to listen to, all of which may contain vital evidence.

The authors are renowned for writing a good adventure, and *SpySnatcher* certainly seems to live up to their reputation. It is a pure text adventure with absolutely no hint at all of any illustrations whatsoever, anywhere; who needs graphics when you get an eight-line description of your location?

```
First-floor corridor                                    2
-------------------------------------------------------------
:e
Sorry, the door appears to be locked. You notice in fact that it is fitted with
a rather unusual lock, on which is stamped the name George.

The time is about 13 minutes after 6.
:n

The time is about 14 minutes after 6.
You are at the north end of the first-floor corridor: to the north lies the top
of a staircase and the corridor continues south. There are two doors leading off
at this point. The one to the west is apparently allocated to someone called
Newton, whereas the one to the east bears a sign saying "Dr Ramanujan. Research
Department."
:e
You enter what appears to be some sort of laboratory, in which a scientist of
Indian appearance is preparing a sample of what looks like coffee. "Eh? Who are
you?" he says, hurriedly trying to conceal his most vital apparatus. "Help!
Intruders!"

In a very short while you are being interrogated by the Security guard, and I'm
afraid your cover is blown.
You appear to have made a complete shambles of your attempt at catching the
mole.
You scored 2 points out of a maximum of about 278.
You have achieved the rating "Licensed to Breathe".
Would you like another game?
?
```

This month's nostalgia quotient topped up by a text adventure. Sigh . . .

The locations are described fully and clearly with the just a touch of humour every now and again. The parser understands more than the basic GO NORTH, and a help system (with hint numbers in the manual) is provided. It is a 'timed' adventure (as is Magnetic Scrolls' *Corruption*) and there are certain tasks you must complete by a given time or you won't be able to finish the game.

After each move you are given the current time which advances roughly a minute a move. Various subtle but important parts of the text change each time you play. People's names and passwords, for example. This means that you must go through the same set of moves each time you start; you can't skip a section, because some vital fact may be different.

The only area that lets the game down is the front end. The game single-tasks in Mode 0; I had hoped it would run in a window on the desktop – you could then use *Edit* to make notes. The data for *SpySnatcher* is contained in a separate directory, which is fine, but if you include the game in a directory where you have more sub-directories, each of these is offered as an adventure when you run *SpySnatcher*! And there isn't even a sprite included for the !Adventure icon.

But, after all, you buy an adventure to play, rather than to criticise the start-up sequence, and *SpySnatcher* is well worth buying.

John Dunn



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4 Mation

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Books (No VAT)

Archimedes Assembly Language	£14.95
Archimedes Operating System	£14.95
C: A Dabhand Guide	£14.95

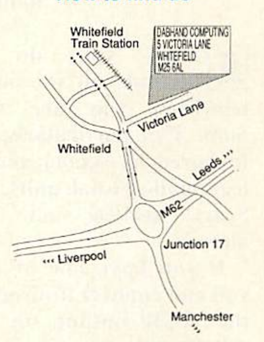
The above books have accompanying discs add £5 for 5.25", £7 for 3.5"

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QUESTIONS AND ANSWERS

Q I was reading a back issue of your magazine, when I came across a reference to an article about connecting an A3000's Scart lead to a normal television set. I have been trying to work my way around this problem for some time and I would be most grateful if you could help me with it.

Tim Vickers
Computer Technician
Birkdale High School
Southport

A **How you do this depends on the sort of television you are using. Some TVs, particularly those favoured by school and college audio-visual units, have Scart sockets on them already.**

If you have one of these, you can connect it directly to the RGB output on your A3000 but, as Scart standards vary between computer monitors and TVs, you will have to make up a special lead. Patrick McTiernan wrote a fine article on this in our December 1991 issue, available from *BAU* Subscriptions in Wetherby (0937) 842489.

If your TV only has an aerial socket on it, you will need an RGB to UHF adaptor which you can purchase from an electronics suppliers.

Q Is there going to be a version of C++ for the Acorn range of computers in the near future? As a student of computer science I need to work a lot in C++, which is probably the most used development environment in the world.

I've tried using Acorn Desktop C but this does not support object-oriented programming.

G Egilsson
Iceland

A **I am sure that somebody will write the object-oriented extensions for C on the Arc at some time but, when I talked to the two main players in this field (Acorn and Risc Developments), they both said that they had no plans for implementing C++ in the immediate future.**

As to C++ being the 'most used development environment in the world'; this may be true in the world of programmers writing for Windows 3.1, but I am willing to bet that more people are still using plain C or possibly even Basic in one form or another.

Still, having said that, C++ is constantly growing in popularity and, hopefully, some whizzy Arc programmers will have a go at implementing it soon.

STAR QUESTION

Q Although my school has recently gone PC mad, I would like to get an A3010 for my own use. Before I do this, I have a couple of questions: Is it true that if I save text from *EasiWriter* as an Ascii file on to a DOS disc, I can load it into MicroSoft *Works* as a text file? How can I load a picture saved by an A3010 into a PC art program?

M.J. Taylor (age 14)
Devon

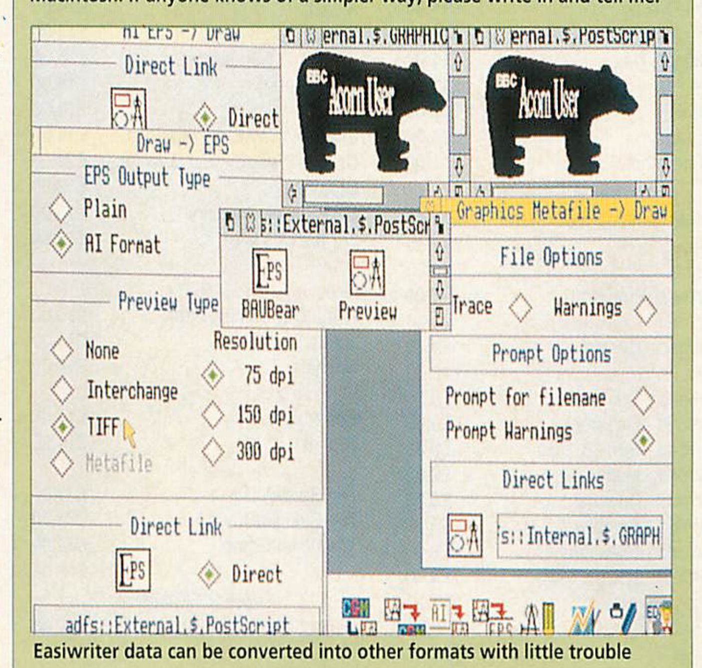
A No worries! Any word processor worth its salt, and *Works* is certainly that, can import and export Ascii text and the drop of a hat. Of course, your writing will have lost any format instructions (font size, bold, underline, centring and so on) that you gave in *EasiWriter*.

Works can also handle CSV files in its spreadsheet and database modes. This is convenient as *EasiWriter* uses CSV to store mail merge data and almost all Risc OS spreadsheets and databases use it for import/export .

On the graphics front, there are several possibilities. *Draw* files can be converted to Computer Graphics Metafile format (as used by Corel *Draw*, *Lotus Freelance Plus* and *Harvard Graphics*) or to Encapsulated PostScript (*Pagemaker*, *Adobe Illustrator* and so on) using careware packages *Draw->CGM*, *CGM-> Draw*, *Draw->EPS* and *AiEPS-> Draw* which are available from most PD houses or from Norwich Computer Services on (0603) 766592.

You can also convert Risc OS sprites into Tiff format and vice versa using two PD programs called *Creator* and *Translator*.

What we could all really do with is a program that transfers Windows 3.1 bit-maps (BMP files) to and from Acorn sprites but, as far as I know, the only way to do this is via Human-Computer Interface's software on the Macintosh. If anyone knows of a simpler way, please write in and tell me.



Easiwriter data can be converted into other formats with little trouble

Q For some time, I have been experimenting with scanning producing, mainly, not very good results. If I use my scanner set to 16 greys, the pictures I get are adequate but when I use 176 or 256 greys, I get a strange coloured picture which, when printed, looks like a 'solarized' negative.

I would be grateful for your help or advice. I have an A3000 and a Computer Concepts Scanlight Junior scanner.

H McDonald
Bexhill-on-Sea

A **I suspect that your A3000 uses Risc OS 2 which can only cope with a grey scale of 16 intensities in its sprites and can't handle the 176 and 256 grey images used by Computer Concepts.**

If you upgrade to Risc OS 3.1, your problems should be solved as these newer sprite formats have been included within it.

Q I use my TV as a monitor and I am constantly having to swap over the computer and aerial leads. Sega makes a device for its console which switches between its output signal and the TV aerial.

Is there a company that produces a similar device for my computer?

E J Preston
Keighley

A **As long as TV reception in your area is reasonable, you should be able to achieve this with a simple two-into-one coaxial adaptor plugged straight into the back of the TV with the aer-**

ial connected to one socket and the Beeb on the other.

The only problem you may encounter is if the BBC's output is tuned to a frequency that is close to one of your local broadcast channels. In this event, you'll have to retune the BBC by adjusting the small screw potentiometer on the UHF modulator.

Be gentle with it as the screw is quite delicate. Y-shaped coaxial adaptors are available from TV or electronic component shops for about £2.00.

Q What does the !Scrap directory do?

V Anthony
Ewell
Surrey

A !Scrap is a directory used by some programs to store temporary files. It is set up by !System using the Wimp$Scrap command.

Sometimes you get the error 'Cannot find Scrap directory' which means that either Risc OS hasn't seen the !System file or the Wimp$Scrap command is missing.

Q With reference to the November 1992 *Acorn User* disc. I was very interested in the PD programs but found that the train was the only program I could get to run.

When I tried to load !Tim, I got the message 'File modules.Clib not found'. I tried loading various !System directories but keep getting errors like 'Clib out of date' or something to that effect. Can you help?

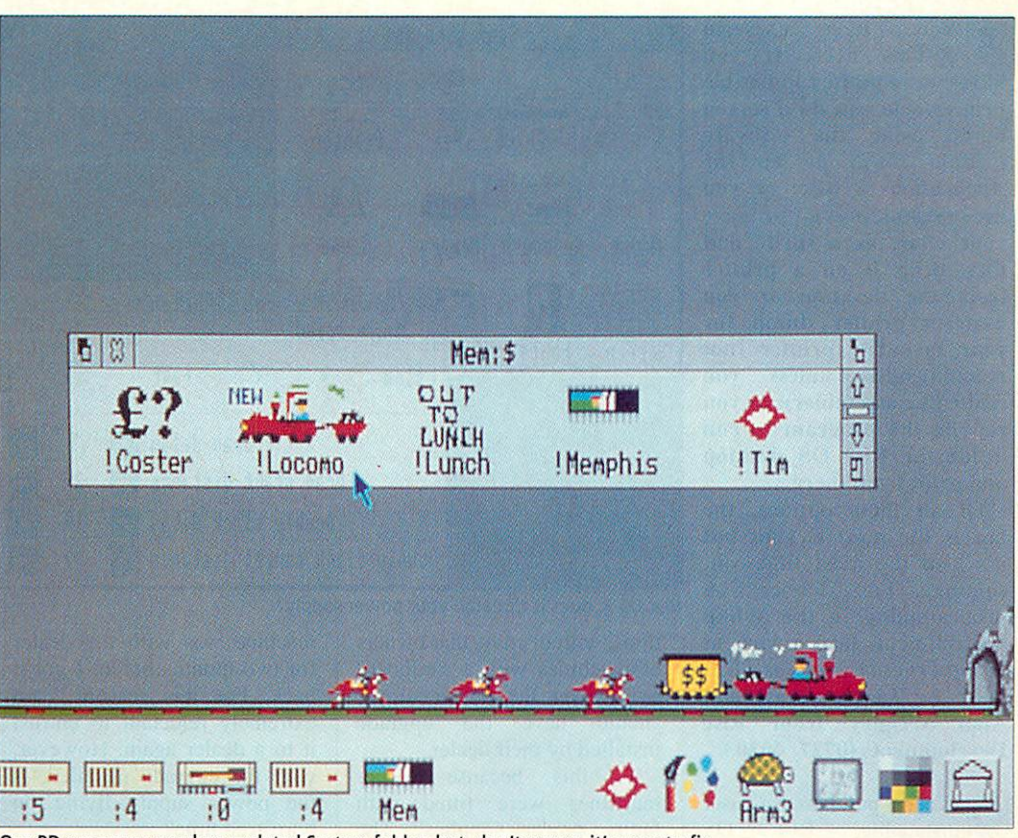
Tom Fabling
Glasgow

A Many programs that run on the Archimedes use modules that reside in the !System folder. The first error occurred because, since you turned your machine, on it had not 'seen' an open disc window containing !System.

You fixed this yourself by opening discs that had !System on them, but versions of Acorn's run-time C library that they contained were out of date for the programs you wished to run. What you need is a new version of !System. If you can't find one among your discs, try asking your local dealer.

A good way to deal with this problem is to regularly update a copy of the system folder every time you get a new piece of software. This is easily done by running the program, !SysMerge, which comes with most packages.

Once you have created this 'master version' of !System, you should back it up and then install it either in the root directory of your hard disc, if you have one, or on a 'start of day' floppy. When this is done, all you have to do is get into the habit of opening this disc each day, immediately after you turn the machine on.



Our PD programs need an updated System folder; but, don't worry, it's easy to fix

Q I have been a devoted Acorn user since the introduction of the BBC in the early 1980s and have owned an Archimedes for two years now. While I have no real complaint about the quality of Arc software, I have had some difficulty getting hold of a Risc OS program for designing labels. Can you help?

M A Bodley
Lincoln

A In the November issue of *BAU*, we ran a news item about a Risc OS program called *LabelText* written by Nicholas Day, aka Sergeant Morley from ITV's *Minder* series. At the time he hadn't decided whether to distribute it commercially so I've passed your letter on to him.

Q I am thinking about getting into Midi music on my A3000. The other day I saw a review in a magazine of the Yamaha TG100 synthesizer module, which is a box that can be attached directly to a PC or a Mac without a Midi interface card. Can I use this instead of a Midi podule on my Arc?

Ron Giggly
Bristol

A The Yamaha TG100 is an interesting little box because, in addition to the 5-pin Midi sockets found on most 'tone generator' modules, it sports a 8-pin mini DIN connector that can be connected to the serial port of a 'host' computer.

This means that, as well as making noises, the box can act as an interface between the computer and other Midi devices thus saving costs for the new user. It transmits and receives at either 31,250 (Midi speed) or 38,400 bits per second (bps).

Unfortunately, the standard serial port on Acorn computers only goes up to 19,200 bps so it won't work on your A3000. It might work on one of The Serial Port's fast dual serial podules, if someone wrote a Midi driver to link it to Risc OS but, since the podule costs as much as a Midi card, the market for this is probably limited to Midi musicians with a need for a high-speed modem. It's a nice idea but I don't think you are going to be able to do it.

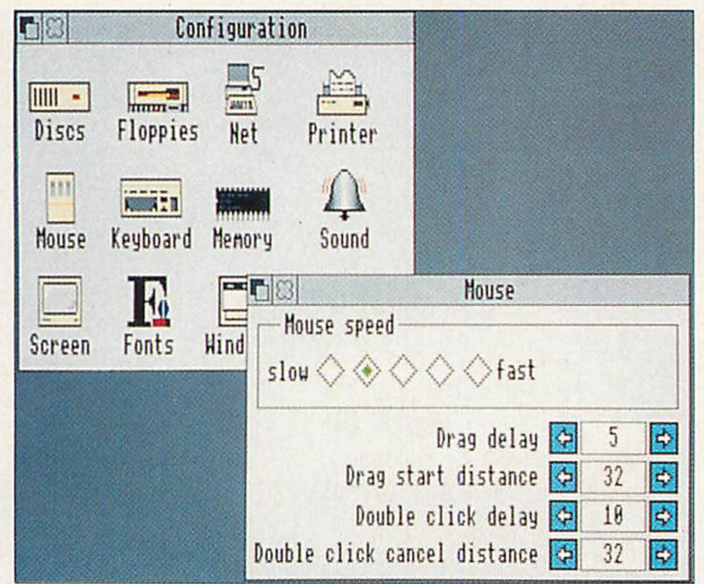
Q I am trying to transfer an astrology program I wrote for the Sinclair Spectrum+ to my Acorn A3000.

I use UDGs for the Astrological signs and the CIRCLE command for the 'Great Wheel' but unlike the Spectrum there is no PRINT SCREEN facility on the A3000 and I cannot print my charts out. Can you help?

Frank C A Cobbett
Worcester Park
Surrey

A You have several options here. If you have an Epson compatible printer, you can do a screen dump using the software module *HardCopy* on the *Applications 2* disc; *or* you use *SCREENSAVE to save your chart as a sprite and then drop it on a printer from the desktop; *or* you write a printer dump for your favourite printer (not recommended unless you really like assembler); *or* you rewrite the program to run inside the Risc OS desktop and print from there.

Of all these options, the last is the most elegant but it's also the most time-consuming. For advice on programming in the Wimp environment, take a look at *Wimp Programming for All*, a book by Lee Calcraft and Alan Wrigley from Risc Developments (0727) 40303.



Risc OS 3: does it threaten your power supply?

Q Having purchased a 'user installable' Risc OS upgrade by mail order for my A3000, I read in the instructions, with dismay, that owners of machines with a cardboard cover over the power supply should have the upgrade installed by their dealer.

Is this because earlier machines were fitted with faulty power supplies? The one in mine failed not long after I bought it and the machine was with the dealer for two months before I got it back. For this reason I am extremely reluctant to entrust it to a dealer again. However, with the upgrade installed, is the power supply living on borrowed time?

D J Brown
Southampton

A Although RISC OS 3.1 is a powerful upgrade, it does not require a vast amount of additional electricty to run it, and is therefore no threat to the life expectancy of your power supply.

Acorn gives this advice as a disclaimer in case someone foolish enough to install the new chips while the power supply is connected to the mains, accidentally sticks his or her finger through the cardboard cover and damages themselves.

It is possible to upgrade one of these machines yourself, but on no account should you attempt to do so while the machine is still plugged in.

If you have any doubts about your ability to do this work safely, you should give the machine to a dealer. Maybe if you shop around, you can find one who will book the job in for you rather than sit on your machine for such a long time.

CUSTOMER HOT LINE

Every month in BAU, Alan Glover from the Acorn customer service department offers you Acorn's advice and support

ADFSBUFFERS: ACORN'S RECOMMENDED SETTINGS

On any computer fitted with Risc OS 2 or Risc OS 3 we recommend that ADFSBuffers is always set at zero. With RISC OS 3.1 it is possible to increase the value. However there is a slight chance that data on a floppy disc may become corrupted if ADFSBuffers is not set to zero. This only applies to the A3010, A3020, A4000, A5000 and A4. With these machines, we recommend that ADFSBuffers is set to zero using the following process:

- Save any work you wish to keep
- Press F12
- Type Configure ADFSBuffers 0
- Press the RETURN key twice
- Shutdown and switch off the computer
- Switch it on again after at least five seconds have elapsed

In situations where no critical data is being handled, you may benefit from an increase in performance if you set ADFSBuffers to four or eight instead of zero.

Please note that switching on your machine with the R or DELETE keys held down will reset ADFSBuffers to a non-zero value, so the process above must be repeated.

We have been investigating the cause of the problem, and hope to introduce a fix as soon as possible to allow ADFSBuffers to be set above non zero on the machine type listed above.

INSTALLING DESKTOP C ON NON-ACORN FILING SYSTEMS

We have now prepared an alternative version of the *Install* program that will work with some third-party filing systems, which the present version cannot handle. If you experience any problems in installing Desktop C, please write to Customer Services to request a copy of the new *Install* program. Before doing so, check that all the discs you are using are free from defects using the VERIFY command.

You should also check to ensure that there are no clashes between the media that you are installing to and the floppy discs; check that there are no files which have the same name as a directory on the floppy disc, and that there is sufficient space available on the destination disc for all the files.

CONNECTING A3010/A3020 TO OLDER ACORN MONITORS

Some people have asked for information about connecting an A3010/A3020 to earlier Acorn monitors such as the AKF17. Acorn does not supply a connecting lead, since these computers are primarily intended for use with AKF30/AKF40 monitors). However, details of the adaptor/cable that is required can be obtained upon request from Customer Services, and ready-made adaptors are available from a number of sources including Interconnections – Tel: (0483) 797418.

PC EMULATOR 1.8

The latest version of the PC Emulator is now available as an upgrade for users of earlier versions of the emulator. Version 1.8 supports VGA and expanded memory (LIM 3.2).

The upgrade offers are:

- From version 1.6 or 1.7 to 1.8: £9 (ex VAT)
- From versions earlier than 1.6: £29 (ex VAT)

To take advantage of this offer, please send your name and address, together with payment and the original PC Emulator disc to PC Emulator 1.8, Acorn Direct, 13 Dennington Road, Wellingborough, Northants, NN8 2RL. Do not send in your MS-Dos or DR-Dos disc.

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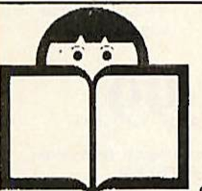
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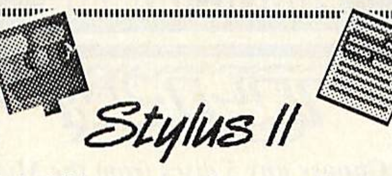
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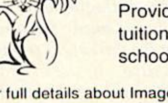
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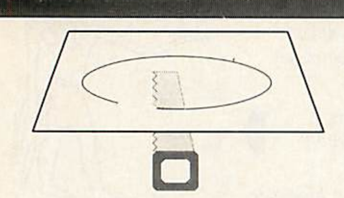


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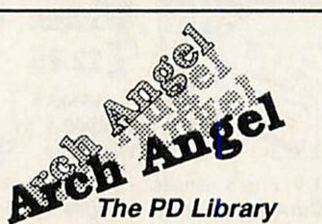


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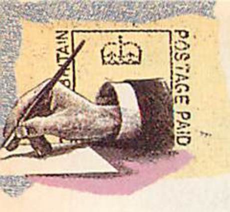
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ACORN USER ADVERTISEMENT PAGES – FEBRUARY 1993



£15 STAR LETTER

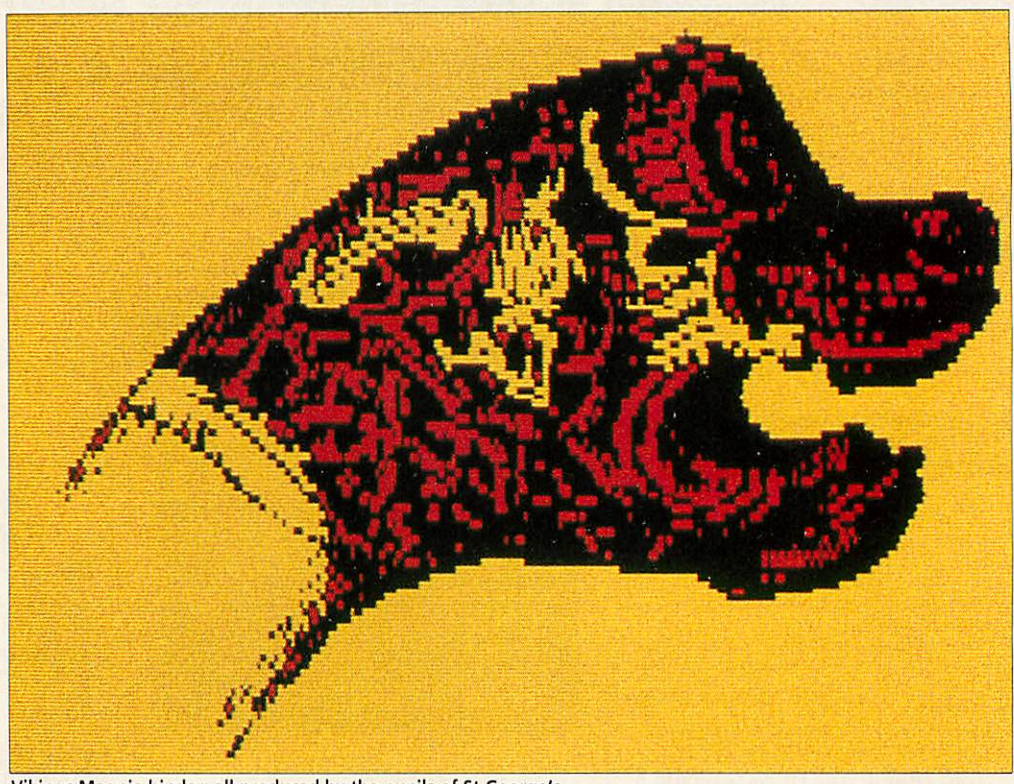
In the November issue on multimedia , you stated that there were no commercial *Magpie* binders. Oh yes there are. . . *Vikings* hypermedia was produced as part of a school project, which was so successful that it led to the formation of a company to sell the work that was produced.

No Frontiers Software is the name of the company, set up and run by children aged between seven and ten from St. George's RC Primary School. The catalogue of hypermedia is now quite extensive including *Vikings*, *Halloween*, *Normans* and, the biggest project to date, *Hyper-Europe*.

The children put the binders together and wrote and collated the material themselves and use a variety of skills which covered areas of the National Curriculum in History, Geography, English, as well as Technology and IT. Software used to produce the books includes *Pendown*, *Edit*, *Ovation*, *Flare*, *Armadeus*, *Oak Record*, *Maestro* and extra hardware includes an Oak recorder and Watford scanner. The binders that feature wallets designed and made by the children are available for the princely sum of £2.50 plus post and packing. So far we have sold many copies to schools, IT centres and even teacher training establishments all over the British isles.

S Robson
Class teacher
St George's School

More and more schools these days are producing Acorn-based resources. And who can blame them? It's certainly a lot more fun than the traditional school bring-and-buy sale.



Vikings Magpie binder: all produced by the pupils of St George's

WHAT A CARD!

When I read your review of graphics cards (January '93) I was delighted. Bigger screens! VRam! Independent output! But what a chance the Acorn world are missing.

Have you ever seen the PC and Mac trick of spreading the 'desktop' over two machines? I've seen dual VGA boards they let you drag windows 'across the gap'. That board plus an ordinary second VGA monitor cost in terms of price and bulk much less than the equivalent huge multi-synch.

Also, that side-by-side setup lets you have nice big boxes in plain sight, not a confusing mix of layered tiles, work-rows and menu-boxes.

GOING UP

I recently purchased the Risc OS 3.10 upgrade for my A3000. I had made a special long-distance trip to pick it up, so I was rather annoyed to find a comment in the fitting instruction booklet, stating that the early A3000s have to be upgraded by a dealer, who may make a charge. My Acorn A3000 fell into this category.

Faced with the hassle of returning to the dealer with my upgrade and my computer, I decided to have a look to see what was involved. On finding that everything looked as described in the booklet, I decided to go ahead and do the upgrade myself.

I did just that and everything seems to be working just fine. So why does the booklet say that this work must be done by a dealer. I'm sure there are many early A3000 owners out there who would like to know about this before they go out and purchase the upgrade.

R. Welham

This advice is purely a precautionary measure. Most A3000s have a metal cover over the power supply, but early versions have a cardboard cover.

In other words, if some users carelessly forget to switch off the power supply, then any slip of the screwdriver could have pretty disastrous consequences.

GOING DOWN

I recently heard that you are intending to run an article about PD libraries available for eight-bit machines.

I run eight-bit software that acts as both a PD library and a user group and produces a monthly issue disc containing the very best of PD software. We also offer a selection of public domain discs, some from other libraries.

Could you let your readers know that anyone interested can write with an sae for more information? Better still if they send a disc and return postage and packing we will give them an introductory issue.

Daniel Shimmin
Eight-bit Software
Heaton
Bolton
BL1 5EE

Thanks for the information; we will be providing readers with more PD recommendations in the near future.

UP NORTH

I am a radio amateur and have a radio amateur friend in Russia. He lives on Dickson Island in the Arctic: a rather isolated place as you can well imagine. He owns an Acorn Atom and has asked me for some help in obtaining some radio amateur software.

Is there a user club that could help? Any information will be very much appreciated by Alex and many of the inhabitants of this remote Russian Arctic island.

W.A. Lindsay-Smith
Devon

It's nice to know that the Atom is alive and well. Any other requests from radio hams out there?

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...Acorn Computing (Jan. 93)

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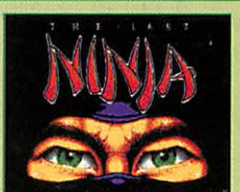
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PLAY IT AGAIN SAM 16

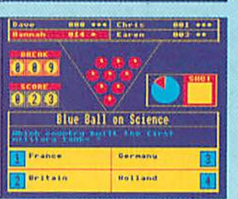
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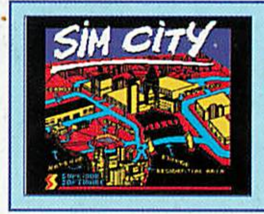
(No BBC Micro or Electron cassette versions available.)



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(The screen pictures above show the BBC Master versions of the games.)

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